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CIVIC ART IN NORTHERN EUROPE*

Small Parks and Open Spaces—Union of Parks and Public Buildings—Civic Centres—Gardens and Playgrounds

By Milo Roy Maltbie

SMALL PARKS AND OPEN SPACES

In this connection it should be noted that much of the pleasure derived from trees, shrubs and grass plots in streets, boulevards and parks comes from the refreshing green of the foliage; and the step from boulevards to parks is a very short one, for a wide boulevard with settees, trees, shrubs, grass plots, twining vines, a streamlet of water, with occasional fountains, as may be seen in Col6gne, is virtually an elongated park. Indeed, it is often better than the same area in one large park. It benefits more people. It is at their very doors, and may be enjoyed morning, noon and night without a long trip to a distant park.

From the viewpoint of number and wide distribution, probably Stockholm, Dresden, Berlin and Vienna are the cities best supplied with small parks. In Vienna the ring of parks

which now occupy the site of the old city walls is very beautiful, but the central portions of the city are not well supplied, especially where population is densest. The newer

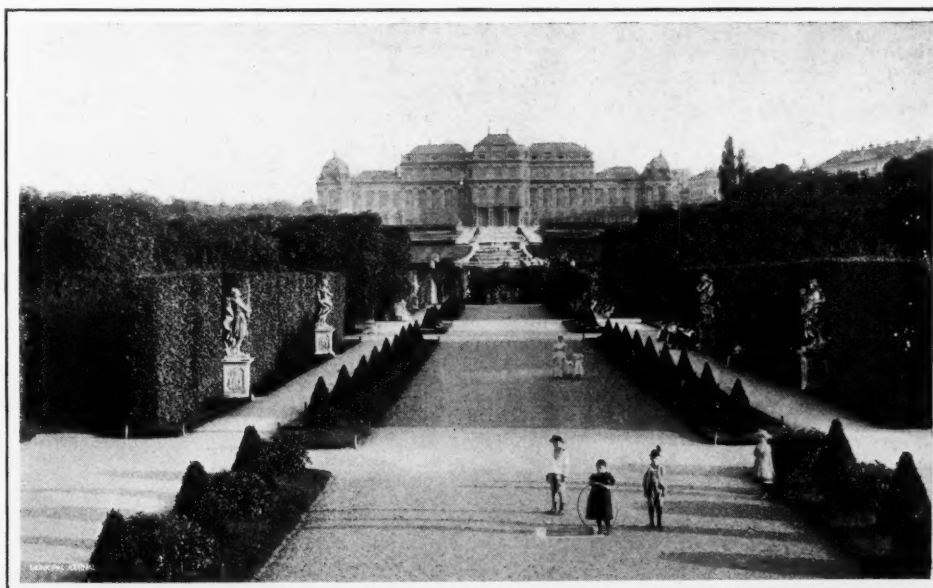
portions are better off, which is true of all cities, and easily accounted for by the recent origin of the park movement and the high cost of land in the older (the denser) districts.

Berlin has more small parks in the centre of the city than Vienna, but cannot boast of so effective a park ring; they are more scattered and are not bound together by boulevards. In Stockholm, also, the parks are quite well distributed. Scandinavian cities generally control churchyards, maintaining them, keeping them open for the public, providing

benches and chairs, and even erecting statuary, thus practically making small parks of them.

Moscow is fairly well supplied with small parks, and, viewing it from Ivan V6liky, one infers that the city is thronged with small parks, so constantly do the patches of green appear among the buildings. Not all are parks, however, but more fre-

quently small private gardens. Except in the districts given over entirely to business buildings, each house commonly has a garden with trees and flowers. These are not seen from the streets because high walls shut them in, but to the householder they serve every purpose of a small park. The chief objection is that in the poorer quarters, where they are needed most, the gardens are not common. In St. Petersburg they



BELVEDERE AND PARK, VIENNA

Showing French Gardening.

* This is the third of a series of four articles, comprising the special report to the Municipal Art Commission of New York City by the assistant secretary, Dr. Milo Roy Maltbie, as the result of studies and observations made in the summer of 1903. It cannot fail to have an intrinsic value to all American cities.—[EDITOR.]

are still fewer in number, except in the districts inhabited by the every wealthy.

St. Petersburg and Moscow have a considerable number of large open spaces, the most important being Place Dvortsovy, Place Krasnaia and Place des Théâtres. But these are open spaces literally, they do not have a tree or a shrub, or even a bit of green grass, merely a wide stretch of level ground paved with cobblestones, over which wagons rumble with abundant noise. To be sure they give a comprehensive view of the public buildings, but such large open spaces dwarf low buildings, and if the ground were laid out with walks, drives, trees, fountains, monuments and grass plots there might still be unimpeded views of the buildings, and the parks thus constructed would be the most beautiful spots of the city. But such a treatment does not appear to have been thought of, or if broached, to have met with approval.

One of the most effective open spaces where grass, shrubs and trees have not been used is Place de la Concorde, Paris.

But here their places are taken by fountains, the Obélisque de Louqsor, ornamental electroliers and statues, and it is bounded upon two sides by parks. The Raadhus-Plads in Copenhagen, the eastern end of Unter den Linden, the Dam in Amsterdam and the Place de l'Hôtel de Ville in Paris are practically vacant spaces, but necessarily so, owing to the immense traffic that flows through

them, and they are not so large as to dwarf the public buildings that border them. However, where it is possible, the use of grass, flowers, trees, statuary, fountains or monuments add greatly to the beauty of an open space.

RURAL PARKS

Passing to large parks, one should note the series of parks and lakes which circle the business centre of Copenhagen. Their natural beauty has been improved by numerous statues, principally the gifts of Herr Carl Jacobsen, a wealthy Copenhagen brewer, who presented the old Carlsberg brewery to the city as a permanent endowment, and of his son, who has continued the work begun by his father.

The Tiergarten of Berlin stands quite alone; it has a character all its own. For impressive solitude, for grand, majestic trees, for cool, shaded walks with no canopy but the closely interwoven branches far above, it is without a rival. In the Bois de Boulogne, Paris, there are sections where

dense shrubbery and ivy-clad trees remind one of a jungle, of a southern wilderness, but the Tiergarten resembles a northern forest. Each in its way is wonderful and a source of enjoyment to millions.

Schoenbrunn, Vienna, is quite different. It represents the formal French gardening of the seventeenth and eighteenth centuries. The gorgeous floral displays on the parterre, the dense hedges, the precision of the walks and drives, the harmonious arrangement of fountains, monuments and sculptures attract thousands every Sunday. Other well-known instances of this style of gardening are the gardens of the Luxembourg and the Palais Royal, Paris, Swinger-Hof Gardens, Dresden, Alexander Park, St. Petersburg, and Lustgarten, Berlin. But the finest instances are, of course, the gardens at Fontainebleau and Versailles, which are so well known as not to call even for a summary of their beauties.

One might continue to enumerate park after park that possesses certain interesting features—where beauty, either

natural or artificial, is a source of keen enjoyment. There is not a city in which some provision has not been made, and usually there are several parks of considerable size. The aim seems to be to supply every quarter, so that no one will be obliged to travel a long distance to reach a park, to hold the balance between large and small parks (for each class has certain advantages not possessed by



PLACE DE LA CONCORDE, PARIS
Showing Treatment of Open Space and Bridge Entrance

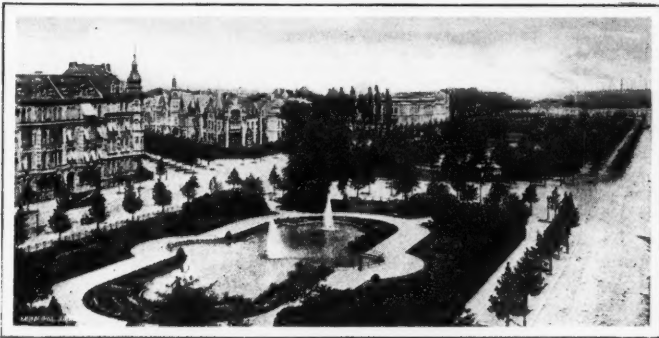
the other), between rural and formal treatment, and to make all as beautiful and as attractive as possible. From the point of view of number and area the citizen of Paris can reach more in an afternoon's excursion than the citizen of any other city. At least 20,000 acres, not including the tree-lined boulevards which are parks in a sense, are open to selection.

GARDENS AND PLAYGROUNDS

Mention should also be made in this connection of the botanical and zoological gardens to be found in many cities. They are frequently very artistic both as to landscape gardening and buildings. The zoological gardens in Berlin and Amsterdam are deserving of special mention. The botanical garden of Brussels is also most artistic. Located upon the side of a hill, it has utilized the advantages of its location and has combined sculpture with landscape gardening with such good effect that none excels it. Then, too, the cemeteries should be noted, for these are frequently under municipal

control. The beauties of Père-Lachaise, Paris, are so well known that every tourist aims to visit it.

Not infrequently European parks appear to the stranger as poorly maintained. This is due to the fact that the public



DEUTSCHER RING, COLOGNE—BOULEVARD TREATMENT

is often permitted to use the parks as recreation grounds. Shows, games and amusements of all sorts are given concessions, and they are freely patronized by the large numbers who throng the parks. "Keep off the grass" is not much in evidence here. Of course such parks, or the portions of the large parks given over to the free and unrestricted use of the public, are not so beautiful as those carefully cared for, but the pleasure and benefit derived from the former are out of all proportion to the loss in art.

SUCCESSFUL METHODS

The methods used to beautify parks are as varied as the landscapes to be treated and as numerous as the designers. The most artistic results have been produced (1) where statuary, fountains and monuments have effectively been introduced in landscape gardening, e. g., Jardin des Tuileries, Vienna Ringstrasse, Copenhagen parks, and possibly the Sieges-Allée, Berlin; (2) where flowers, shrubs and trees have been harmoniously combined, e. g., Kungsträdgård in Stockholm, Orsted Park in Budapest, Stadtpark in Vienna and Jardin des Tuileries in Paris; and (3) where natural conditions have been utilized, e. g., the lofty hill park (Brunnsparken) in Helsingfors, extending into the harbor, with its monument to the shipwrecked, the cascade park in Brussels, where a stream of water is carried by successive cascades from a fountain on the hill to a tree-bordered lake at the foot, all to be surrounded with statuary, the moun-



ROYAL THEATRE, BERLIN—SURROUNDED BY SMALL PARK

tainous Blocksberg of Budapest, the river parks of Liège, Munich, Prague, Altona, Nuremberg and Rotterdam, and the island parks of Vienna, St. Petersburg and Stockholm.

Natural conditions so largely determine the effectiveness

of parks that location becomes a most important factor, and often the areas having the most natural advantages are those least adapted for other purposes. Such precipitous hills as stud the old city of Ofen in Budapest could be used with difficulty as residential or business districts, but they make beautiful parks, and statuary, fountains, flowers, etc., are as effectively utilized as in the level plains of the Stadtwaldchen. Stockholm wisely dedicated long ago the rocky wilds of Djurgard to public use. Copenhagen has the romantic park of Fredericksberg-Have. Hamburg has taken advantage of the Binnen and Aussen-Alsters, in the centre of the city, and converted the shores into parks. But Antwerp has forgotten its river frontage or fails to appreciate its advantages as a site for a park.

Large rural and country parks may be located where nature offers the greatest inducement, and the principal lesson to be learned from European cities is that sites should be chosen far in advance of urban growth, as near the heart of the city as possible, and the public afforded every facility for reaching them quickly, easily and cheaply. Indeed, proper transit facilities are as important as the park itself, for it has no value unless used, and its beauty is wasted if not generally enjoyed. In this connection, one very utilitarian lesson



BOULEVARDE MONTMARTRE, PARIS—TREE PLANTING

should be learned, viz., that as the parks are for the public, restaurant facilities at moderate rates are much more important than stylish cafés with elaborate menus and expensive service.

The ideal system of small parks and playgrounds is one which supplies every district of the city, and the poorer districts best of all. Their limited area makes it impossible to depend upon natural advantages for artistic development, and resort must be had to artificial treatment. This plan has been followed everywhere in Europe, as evidenced by the many instances cited above and others that might be mentioned.

UNION OF PARKS AND PUBLIC BUILDINGS

In one very important respect European cities are far in advance, viz., the combination of small parks and open spaces with sites for public buildings. We are apt to stow away our public buildings among private structures, upon narrow streets and in out-of-the-way places.

European cities upon the other hand commonly locate their public buildings so as to front upon parks or open places. The attractiveness of the park is thus increased, owing to the presence of beautiful buildings, and its use as a park is

not interfered with, but instead facilitated and encouraged. The park in turn adds to the beauty of the buildings, as the open area permits it to be viewed from the proper distance and with the proper prospective, which is impossible in a narrow street.

Instances could be cited from almost every city in continental Europe. Those best known are the Louvre and the Tuileries Gardens, the Grand Palais and the Petit Palais des Beaux-Arts with the surrounding gardens, and the Trocadéro, with its park sloping down to the Seine (Paris), the Prefecture and Palais des Beaux-Arts upon the Place de la République (Lille), the Royal Library in the Humlegård (Stockholm), the Art Museum, court houses, etc., in the ring parks (Hamburg), the Admiralty, the Senate, St. Synode, Ministry of War, bordering Alexander Park, the Museum to Alexander III., with parks and open spaces on all sides (St. Petersburg), Stadt-Halle in park (Mainz), the Parliament Building in the corner of the Tiergarten, the museums, the new Cathedral and the Royal Castle surrounding the Lustgarten (Berlin), and the long procession of buildings along the Ringstrasse (Vienna), beginning at the east with the industrial museums and ending at the north with the Bourse, each fronting upon a park or in a park or partially surrounded by parks. If there is any doubt as to the contribution made to civic art by such a union of park and public structure, imagine any one of the buildings just mentioned robbed of its location and snugly stowed away in a narrow street.

OPEN SPACES AND BOULEVARDS

It is not always possible to have a park adjoining a public building; traffic may be too great. In such cases an open space is often provided, occupied, if at all, only by a few small structures, such as a monument, a fountain or a statue. This accomplishes the same result as produced by a park, for the public building is thereby given the dignity which should attach to public buildings and which cannot be theirs if elbowed by every tumble-down shanty or overshadowed by every towering shaft. How must the beauty of the Palace of Justice and Hôtel de Ville in Brussels, the Parliament Building, Royal Courts and Ministry of Education in Budapest, the University, Arsenal and Imperial Bank in Berlin, city halls in such cities as Havre, Warsaw, Breslau, Dijon, Strassburg, Dresden, Paris and many other cities, and the Pantheon, the Hôtel des Invalides, Notre Dame, Ministry of Marine, and the Old Louvre in Paris is due to the open space in front of each?

In still other instances public buildings are located along

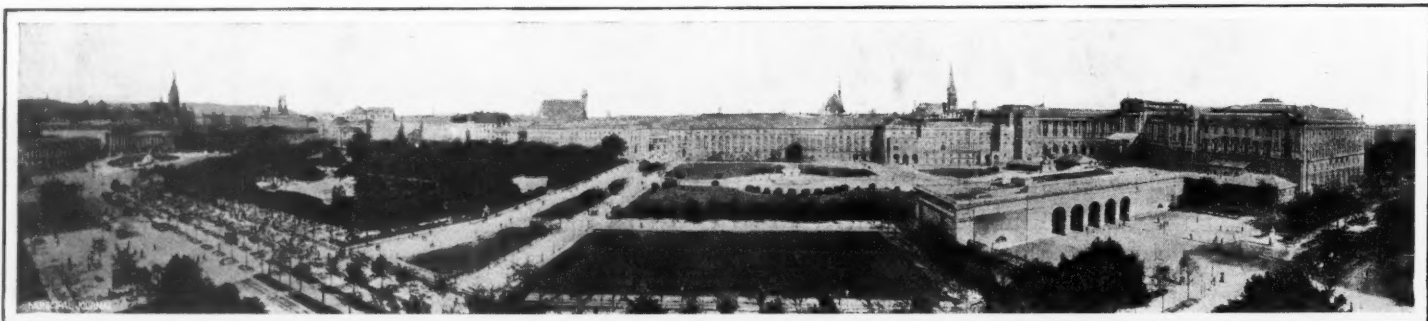
wide streets, avenues or boulevards (e. g., Palace of Justice in Antwerp, and the string of buildings along Ludwigstrasse in Munich), upon the river front (e. g., University of Liège, Parliament in Budapest, and the numerous public buildings along the Neva in St. Petersburg and the Seine in Paris), upon elevations (e. g., the Kremlin, Moscow, the Palace of Justice, Brussels, and the Royal Palace in Budapest), at the termini of bridges (e. g., the Institute opposite the Pont des Arts in Paris and the Maximilianeum opposite Maximilians-Brücke in Munich), and at the termini or turning points of streets. The many advantages of this suggestion have been discussed in preceding paragraphs.

CIVIC CENTRES

Many cities have gone still further and have grouped several public buildings around a park or an open space or along a prominent street or boulevard, thus creating a centre of civic life and interest. In Berlin Unter den Linden and the Lustgarten form the nucleus where cluster palaces, Cathedral, museums, Arsenal, University, ministries, Opera House, fountains, monuments and statuary. In other parts of the city there are small local centres, such as the Königs-Platz, northeast of the Tiergarten, Leipziger-Platz and Gendarmen-Markt, with its two churches and Royal Theatre. In Dresden, the Zwinger, with all its many departments, the Royal Palace, the Princes Palace, the Court Church and the Royal Theatre, are grouped, and joined by the Brühl Terrace with another group to the west. The Kremlin, Moscow, with its numerous cathedrals, palaces, convents, Arsenal, Tribunal and Synode, has frequently been referred to. Stuttgart boasts of an effective centre with the Palace as the focus about which are located the principal buildings of Wurtemberg.

In Paris, there is first of all the Ile de la Cité, with the Palace of Justice, Sainte-Chapelle, Tribunal de Commerce, Prefecture de Police, the Hospital Hôtel Dieu and Notre Dame, with the Hôtel de Ville immediately across the Seine. The Louvre is a centre in itself, but emphasis is added by the Mairie of the First Arrondissement and the Church of St. Germain-l'Auxerrois to the east and the Palais Royal to the north. The Pantheon and the Sorbonne, with the many other schools, libraries and chapels adjoining, form a centre of education and civic patriotism in another part of the city.

In Brussels, the Grande Place, about which have stood for generations the Hôtel de Ville, Maison du Roi and the guild halls of the associations that formerly governed the city, has been restored and redecored during the past few years. The city authorities have granted subsidies to the private



Parliament

Royal Theatre

Old Palace

Burghor

Modern Palace

PANORAMA, RINGSTRASSE, VIENNA

owners to decorate and restore the façades in harmony with the general plan, and where the landlords could not be induced to co-operate, the city has purchased the buildings and has done the work itself. The halls date from the seventeenth and eighteenth centuries, and when the plan is completed, Brussels will have one of the most interesting and artistic centres in Europe, although not so grand as those of Berlin, Paris or Vienna.

it is the finest civic centre to be found in the world. The artistic values of civic centres is evident. They give opportunity for a grandeur of treatment, a harmony of varying structures and an effective combination of all the arts, that is not afforded by one building or a large number of unrelated buildings scattered throughout the city. The effect, one may say, increases in geometrical ratio and arouses civic pride and patriotism to a marked degree. It only requires



Parliament

City Hall

University

PANORAMA, RINGSTRASSE, VIENNA

Many other instances could be cited from small as well as large cities, but to Vienna must be given the palm for the most comprehensive artistic scheme. Along the Ringstrasse or about the parks which border it, are to be found nearly all of the more prominent public buildings of the city. This ring separates the Inner from the Outer City, and such excellent taste has been used in the location and planning of buildings, monuments, statuary, fountains, parks, etc., that

a little foresight, a well-considered plan, and a determination not to be swayed by interests which may wish, for selfish reasons, to secure the location of buildings elsewhere than were planned. The entire scheme does not need to be completed at the moment, but as buildings are needed and as funds are secured, the project may be pushed; only, there must be a broad comprehensive plan to follow—a goal to be reached.

(To be concluded in April)

PORTLAND CEMENT

Its Uses in Various Engineering Constructions—The History of the Industry and Its Rapid Development

By E. Kuichling, C. E.

PHYSICAL CHARACTERISTICS

HAVING seen that the material called Portland cement is essentially the product formed by burning to the point of vitrification or fusion an artificial mixture of certain varieties of carbonate of lime and clay, and then grinding the resulting mass to a very fine powder, it now becomes of interest to study in some detail the nature of the raw materials commonly used in its manufacture, as well as the physical characteristics and chemical constitution of the finished product.

The carbonate of lime selected for making cement is usually some conveniently located natural formation of chalk, marl, or non-crystalline limestone. Briefly defined, chalk is a soft, whitish or gray, earthy limestone, consisting variously when dried of 75 to 98 per cent. carbonate of lime, 1.0 to 10.0 per cent. silicious matter, 0.5 to 4.0 per cent. alumina and iron oxide, along with small quantities of potash, soda, magnesia and sulphuric acid. Marl is a whitish or gray calcareous clay, containing variously when dried 50 to 90 per cent. carbonate of lime, 1.0 to 20.0 per cent. silica or silicious matter, 1.0 to 10.0 per cent. alumina and iron oxide, and small quantities of potash, soda, magnesia and sulphuric acid. The lime-

stones are usually of a gray color, and are composed of 70 to 95 per cent. carbonate of lime, 2.0 to 14.0 per cent. silica, 1.0 to 8.0 per cent. alumina and iron oxide, 1.0 to 5.0 per cent. carbonate of magnesia, and 0.3 to 1.5 per cent. potash, soda and sulphuric acid.

Clay is an impalpable, more or less plastic and unctuous substance, resulting from the atmospheric decomposition of felspar and other similar minerals. It contains when dried 3.0 to 30.0 per cent. carbonate of lime, 20 to 65 per cent. silica, 10 to 30 per cent. alumina, 4 to 14 per cent. iron oxide, 1.0 to 6.0 per cent. magnesia, 0.5 to 2.5 per cent. potash and soda, and 1.0 to 4.0 per cent. sulphuric acid. The silica and alumina in clay are mostly found combined as silicate of alumina, although some of the silica usually unites with other bases to form a great variety of double silicates. We thus have as the essential raw ingredients of Portland cement carbonate of lime from the chalk, marl or limestone, and silicate of alumina from the clay, all the other substances mentioned being regarded as practically unavoidable, and more or less detrimental impurities.

It may also be remarked that the chemical analysis of both

the raw materials and finished product is beset with many difficulties, and hence it is not surprising that, with the endless variety of composition within the wide limits named above, and the obscure nature of the reactions involved in the setting and hardening of cement, the process of manufacture required so many years for its successful development. Even at the present time, chemists are not agreed as to methods and reactions, but the researches made within the past few years have done much to establish a sound theory and narrow the scope of future investigations.

The chief characteristic of cement is that when the fine powder is mixed with water alone, or with water and sand, into a paste, the plastic or semi-liquid mass soon begins to become rigid and gradually hardens or acquires cohesive strength throughout its entire bulk. Two distinct stages in this process are recognized, the first one being termed "setting" and the second "hardening." The first usually requires only a short time, ranging from a few minutes to a few hours, while the second requires for its completion a period varying from six months to a year or more. Another important characteristic of good cement is that the mortar or paste undergoes no marked increase or diminution of volume while setting and hardening, and that the latter processes will take place under water as well as in air. Cement differs greatly from lime in these respects, as the hardening of pure lime mortar proceeds slowly and depends mainly on its desiccation and the absorption of carbonic acid from the atmosphere; also because an appreciable shrinkage of volume occurs in such mortars as they become dry.

NATURAL CEMENTS AND HYDRAULIC LIMES

Hydraulic limes and natural cements possess properties similar to those of Portland cement, but differ therefrom generally in having a more rapid "set" and much lower ultimate strength. While the principal constituents of the raw material may be the same in each class, their relative proportions may vary greatly, and the value of the resulting product will depend on the mixture that nature has made in the formation of the rock, as well as on the temperature at which it is burned or calcined. For this latter process a temperature of 800 to 1,000° C. has usually been considered sufficient, whereas for making Portland cement a temperature of 1,200 to 1,500° C. is required in order to bring the material to the stage of incipient fusion or vitrification which experience has shown to be necessary.

It has also been found that there is much variation in the quality or composition of natural hydraulic limestone in the different layers, and even in different parts of the same layer of an extensive quarry. This fact makes it extremely difficult to secure a product of uniform quality. With Portland cement, on the other hand, the raw materials are found much more evenly constituted and can readily be blended so as to obtain at all times the desired proportions; hence, if proper care is used in the several stages of manufacture, such cement will exhibit a uniformity of composition and behavior that has hitherto not been attained by natural cements.

In color, Portland cement powder is gray, or slightly greenish or bluish gray. A brownish color is often regarded as indicating either insufficient calcination, or the use of unsuitable clay, or possibly an excess of clay. Under the microscope the finely ground powder should appear, accord-

ing to German authorities, like angular leaves or scales, colorless when in a thin layer, and greenish or violet in thicker masses. In his large treatise on "Portland Cement," Butler recommends the microscopical examination of the coarser particles of the powder, which pass through a 76 sieve and are retained on a 120 sieve. With a low-power (one inch) objective, these particles of a pure well-burned cement will appear dark or almost black, somewhat resembling coke, and have the characteristic spongy appearance of cement clinker.

CEMENT OF COMMERCE

"The ordinary cement of commerce, however, does not always consist of thoroughly burned portions only, as a more or less appreciable quantity of insufficiently calcined material finds its way into the mills. The appearance of these insufficiently calcined particles, examined in the same way, is practically the same in shape and structure, but the color, instead of being black and coke-like, is of a light brown semi-transparent nature, resembling gum arabic. The particles of an ordinary commercial cement, therefore, composed of a clinker more or less well-burned, examined under these conditions, range in appearance from a light brown, semi-transparent, porous substance, to the coke-like mass above described." Butler also states that he has always found these particles, whether the cement was ground by mill-stones or by edge-runners, to have a more or less rounded shape.

In weight, Portland cement is considerably heavier than any natural cement, and thus affords a means of recognition when both have the same color. In general, the harder a cement is burned, the more it will weigh, and an increase in weight relatively to a light-burned product, usually marks an improvement in quality. On the other hand, it is found that when the burning is carried much beyond the point of vitrification, the quality deteriorates although the weight increases. Fineness of grinding and age also affect the weight, as Faija found from several experiments that the finer the cement was pulverized, the less it weighed per cubic foot, and that there was a progressive reduction in the weight of freshly burned samples up to the end of one year. In this period of time the loss amounted to nearly 16 per cent., while after six months it was about 11.5 per cent.

Similar observations have likewise been made by various other investigators, who found that by long storage the cement would absorb moisture and carbonic acid from the air, whereby its volume would increase slightly, and thus cause a reduction in its specific gravity from 3.2 to 3.1. According to French and German standards, the specific gravity of freshly made Portland cement should range from 3.12 to 3.25, while according to English and American standards it should range from 3.05 to 3.15; and after having been stored for a few months it may become reduced about 10 per cent. The determination of the specific gravity is of particular importance to cement makers, as it is a ready means of ascertaining the degree of calcination attained in the process of burning. As water cannot be used for the purpose, paraffin, turpentine or benzine are commonly employed as liquids in which a given weight of cement powder is immersed and its displacement noted.

When exposed to the air under proper shelter for a considerable time, a good cement should not exhibit any appreciable change in its properties other than a slight reduction

of specific gravity as stated above, and an increase in its time of setting. An originally hard-burned and quick-setting cement usually becomes slower-setting with age, and if it is of good quality, this change takes place without impairing its ability to harden and attain the same ultimate strength as when used in its freshly-burned condition. Light-burned cements, on the other hand, are affected in much greater degree by age. They not only become slower-setting by long exposure to the air, but may also gradually lose their ability to harden and finally become inert.

Another important physical characteristic of Portland cement is the extreme fineness to which it is ground. German and French standards require that at least 90 per cent. by weight of the powder shall pass through a wire cloth sieve having 5,806 meshes per square inch, the diameter of the wire forming the sieve being one-half the clear width of each mesh. This corresponds very nearly to 76 wires per lineal inch, each wire being 0.0044-inch in diameter, and each mesh 0.0088-inch square in the clear between wires. Some recent English and American specifications call for at least 98 per cent. by weight to pass through a sieve having 50 meshes, 93 per cent. through one of 76 meshes, and 85 per cent. through one of 100 meshes per lineal inch, the diameter of the wires being respectively 0.0084, 0.0052 and 0.0044-inch, thus giving meshes respectively 0.0116, 0.0080 and 0.0056-inch square in the clear.

Earlier English and American standards did not require such great fineness, and demanded only that from 90 to 95 per cent. of the powder should pass through a sieve of 50 meshes per lineal inch; but after the value of fine grinding was better understood, the standard was gradually raised. At the present time, some manufacturers announce that in consequence of improvements in methods of grinding, they are able to furnish cement so fine that 99 per cent. will pass through a sieve of 100 meshes, and 91 per cent. through one of 200 meshes per lineal inch, the wires here having diameters of 0.0045 and 0.0020-inch respectively.

The reason for this fine grinding is that the strength of the mortar is greatly increased thereby, as the coarse particles do not possess as much chemical activity when mixed with water as the fine powder. If separated from the latter by sifting, they exhibit little or no tendency to set within a reasonable time on being moistened, but after a relatively long period under water they develop more or less coherence, and appear to be united by a white crystalline material. On the other hand, when they are pulverized, the resulting powder is often found to make a stronger mortar than the cement in its unsifted state. By fine grinding, therefore, the cement is able to set quicker and unite with a much larger proportion of sand than when coarsely ground.

CHEMICAL CONSTITUTION

On analyzing good domestic and foreign Portland cement chemically, it is found to consist of from 57 to 67 per cent. lime (CaO), 20 to 28 per cent. silica (SiO_2), 5.5 to 10.5 per cent. alumina (Al_2O_3), 2.1 to 4.8 per cent. ferric oxide (Fe_2O_3), 0.5 to 2.9 per cent. magnesia (MgO), 0.2 to 2.8 per cent. soda and potash (Na_2O and K_2O), 0.2 to 2.4 per cent. sulphuric acid (SO_3), and 0.4 to 6.2 per cent. water and carbonic acid (H_2O and CO_2). In well-burned cements the carbonic acid is generally either absent or present in

only very small quantity, rarely reaching 1.0 per cent. and usually not exceeding 0.3 per cent.; and similarly the quantity of water seldom exceeds 2.0 per cent. All of these ingredients were contained in the raw materials, but it will be noticed that nearly all of the carbonic acid in their composition has been expelled by the process of calcination.

Unfortunately, these ultimate analyses afford no good indication of the actual arrangement of the several components in the material, and while chemists have long striven to determine the probable reactions which take place in the burning of cement, many difficulties of a technical character have hitherto prevented the attainment of entirely satisfactory conclusions. It is generally held that cement consists of basic silicates and aluminates of lime, which form crystalline hydrated compounds with water, and thus cause the wet substance to set and harden; but the exact composition of these salts, as well as the parts played by the iron oxide, the magnesia and the two alkalies remain obscure or in dispute.

In other respects it is known that about 98.6 per cent. of the cement can be dissolved in hydrochloric acid, whereas most of the clay in the mass before burning was insoluble. By intensely heating the clay in contact with lime, up to the point of fusion, its composition evidently becomes radically changed, and hence the determination of the percentage of residue insoluble in this acid is of importance, as it marks the efficiency of the calcination as well as the quality of the cement. Natural cements and hydraulic limes, which are made from rocks containing relatively high proportions of clay and magnesia and are burned at much lower temperatures than Portland cement, always give such an insoluble residue which is several times greater than that derived from the latter, and this circumstance has been considered as accounting for their inferior strength.

The temperature and duration of the calcination thus become vital factors in the manufacture of cement, as it is well established that although the composition of the raw material may be correct, yet in consequence of insufficient mixture and burning, a poor product will result. It is also known that the carbonic acid of the original carbonates in the raw material is driven off at a comparatively low temperature, so that tests for the quantity of this acid in the product are useless. As to the magnesia, experience has taught that a large percentage is undesirable in strongly calcined cement, and similarly with the other constituents mentioned above. Chemical analyses can therefore give only approximate indications of quality, and opinions based thereon must be confirmed by a variety of careful physical tests.

Recent reviews of the literature pertaining to the chemistry of Portland cement, show that while the subject has received much attention for about a century, yet the greater part consists of theories or speculations, and that conclusions based upon synthetic experiments are few in number. The most important of the latter prior to 1887 are the French investigations of Vicat in 1818, Berthier in 1822, Rivot in 1856, and Fremy in 1865. The first two established the fact that a silicate of lime (SiO_3 , CaO) was formed by the burning of the raw materials, while Rivot came to the conclusion that in this process two substances were formed, viz.: a tri-calcic silicate (SiO_3 , 3CaO) and a tri-calcic aluminate (Al_2O_3 , 3CaO) and that setting was due simply to the

hydration of these compounds. Fremy failed by his methods to obtain a silicate of lime which would set with water, but succeeded with the aluminate, and was led to attribute to the latter a preponderating influence in the hardening of cement mortars.

EXPERIMENTS OF LE CHATELIER

In 1887 and 1893 Le Chatelier of Paris, published the results of his exhaustive investigations of the character of the various combinations of lime, silica and alumina. The thoroughness of his work soon attracted profound attention, and led others to continue these difficult but highly interesting researches. His conclusions were that three different anhydrous silicates of lime exist, viz.: (SiO_2 , CaO), (SiO_2 , 2CaO) and (SiO_2 , 3CaO), along with three calcic aluminates, (Al_2O_3 , CaO), ($2\text{Al}_2\text{O}_3$, 3CaO) and (Al_2O_3 , 3CaO), also with similar ferrites of lime and mixed ferrites of lime and alumina.

Of these, the mono-calcic silicate exists in nature as the mineral Wollastonite, and does not set or harden under water, but does harden in the presence of carbonic acid. The di-calcic silicate does not appear to exist in nature, but can be produced artificially by fusion of the proper proportions of lime and silica at high temperatures, and then crumbles into powder on cooling; it is not acted on by water, but is easily decomposed by solutions of ammonia salts, and sets rapidly in carbonated water. Tri-calcic silicate cannot be produced synthetically, all attempts having resulted only in a mixture of di-calcic silicate and free lime, which heats and slakes with water and then sets slowly. Its existence, however, must be assumed, because its characteristic crystals are found profusely, in the microscopical examination of the clinker. It can, however, be obtained indirectly by using calcium chloride (CaCl_2) as a flux, and then decomposing the resulting chloro-silicate by steam above 450°C .; made in this way it sets very slowly and with constant volume. Le Chatelier also refers to hydrated calcic silicate (SiO_2 , CaO , $2.5\text{H}_2\text{O}$) as being impossible to obtain by the direct action of water, and produced only as a precipitate from a colloidal solution of silica and an excess of lime water.

Of the calcic aluminates, the first or mono-calcic aluminate on being pulverized sets rapidly with water, and if left immersed a part of the lime and alumina will dissolve. The second, ($2\text{Al}_2\text{O}_3$, 3CaO) also sets quickly with cold water, but is not stable in boiling water; and if agitated with an excess of cold water, some of the lime and alumina will dissolve. The third or tri-calcic aluminate is uniformly crystallized when examined in thin section under the microscope; it is the most easily fusible of the aluminates and in other respects is similar to the second. Several hydrated calcic aluminates are also described, but only one of them (Al_2O_3 , 4CaO , $12\text{H}_2\text{O}$) appears to have a definite character.

Ferric oxide (Fe_2O_3) combines with both lime and alumina. With equal equivalents, fusion occurs at a very high

temperature, and with two or three equivalents of lime it takes place rapidly. The mixed ferrites of lime and alumina are more fusible than the single salts, and some of them like (Al_2O_3 , Fe_2O_3 , 3CaO) are crystalline and unalterable in water. The ferrites of lime slake more or less quickly and swell like quick-lime, but do not set. In addition to the foregoing, there are also numerous compound silicates none of which are acted on by water.

Le Chatelier's thorough study of thin sections of cement clinker under the microscope convinced him that the two essential elements of Portland cement were tri-calcic silicate and a compound termed silico-alumino-ferrite of lime, or double silicate of alumina, iron and lime. The former appears as the most abundant element in the shape of colorless cubic crystals, embedded in a dark semi-crystalline mass or filler of the latter, along with some other undefined crystalline matter and some very small crystals. The action of various reagents on the thin sections indicates that all these compounds contain lime and silica. Ammonia salts destroy the cubic crystals which form the larger part of the clinker material in fifteen minutes, while the other constituents disappear only after several hours. These cubic crystals of tri-calcic silicate are presumed to be the principal agents in the hardening of cement, as they alone appear to be of sufficiently alterable composition.

He also found in his investigations that free lime is of rare occurrence in a well-burned cement, inasmuch as the addition of only one per cent. of such lime causes a serious diminution of its strength and constancy of volume. Cement which has set or hardened consists of hydrated mono-calcic silicate (SiO_2 , CaO , $2.5\text{H}_2\text{O}$) and calcic hydrate (CaO , H_2O). When viewed under the microscope, two or three hours after setting, large crystals of the latter substance begin to appear, followed by a mass of extremely fine interlacing needle-shaped crystals of the former substance, and finally by the formation at variable intervals of small spherulites supposed to be the calcic aluminate.

In regard to the composition of the mixture of lime and clay before burning, he states that "if lime is in excess, it forms at first aluminate of lime, and then with a great excess, ferrite of lime, and probably also free lime. On the other hand, if lime is present in insufficient quantity, it forms di-calcic silicate which is recognized by the spontaneous crumbling of the clinker into powder. When the mixture is imperfect, or the burning insufficient, the reactions are incomplete, and in spite of a proper average composition there is produced at the same time free lime, aluminate of lime and di-calcic silicate." He also gives two chemical formulas for computing the proper proportion of lime, to be used with given quantities of silica, alumina and other ingredients contained in the raw materials. As these formulas and their explanation are rather complicated, they are here omitted.

(To be Continued.)

THE BITULITHIC PAVEMENT*

One Engineer's Experience in Laying It and the Opinions of Many Others—Methods of Construction

By W. A. Hoyt, C. E.

The wearing surface must have three chief properties which have long been recognized as essential to a good road material. They are: Hardness, or "the resistance which a material offers to the displacement of its particles by friction"; toughness, or "the power possessed by a material to a pitch, it makes a product lacking in cementing and binding power. The latter property is furnished by the bitumen, therefore a harder and tougher stone, not suited to a macadam pavement, can be used.

The *bituminous cement* used must furnish this cementing or binding power. According to the specifications furnished by the patentee of this pavement, the bitumen or pitch shall be free from water, petroleum oil, naphthalene, and other crystalline matter, susceptible to atmospheric influences.

As this pitch is surrounded with so much mystery, and is the chief point of attack, an attempt was made to get some definite information upon the subject. Expert chemists were unwilling to commit themselves, and any general information was hard to find. It is, however, manufactured from coal tar by a process of distillation, unknown to the public.

The method of numbering employed by the Bitulithic Paving Company for the different grades of bitumen is an arbitrary one. It has no connection whatever with the method used in numbering paving pitch. In the manufacture of paving pitch the old still held forty barrels, if 10 per cent or four barrels was distilled off, the residue was called No. 4, if six or eight barrels were run off the remaining pitch was called No. 6 or No. 8.

The whole subject of coal tar distillates is, to the lay mind, extremely disconcerting and experts themselves seem to be treading uncertain ground. It appears to be a "dark continent" of chemistry, the interior of which no one has explored often enough to be sure of his land marks.

Mr. Chauvenet, an eminent mineralogist, says: "As far as an analysis is concerned, I do not hesitate to say that I would not venture on the examination of a bitumen to pronounce upon its value as a paving material."

Mr. Dow says: "The science of chemistry is not advanced sufficiently to be of any value in examination of asphalt; but physical examinations are of a great deal of use, and can be relied upon to indicate what bitumen are suitable for paving purposes."

Further, Mr. F. J. Warren states, "I am free to say that chemical tests are of comparatively little value as compared to physical tests."

* This paper was prepared after most painstaking efforts to get the facts in the case, and read by W. A. Hoyt, C. E., construction engineer for the Commissioners of Public Improvements, Kalamazoo, Mich., before the Michigan Society of Civil Engineers, at its convention at Lansing, Mich., Jan. 15, 1904, and here published with the permission of the author. Mr. Hoyt is a graduate, civil engineering course, of the University of Wisconsin, and was formerly assistant city engineer of Providence, R. I., and Altoona, Pa. He also spent a short time on railway work in Colorado and Ontario, Canada.—[EDITOR.]

There are no standard methods of tests, whether physical or chemical, at present, and experts appear to be sure of only one thing, and that is that they cannot agree. It is a good thing that the government has in its employ one expert, else the public would be entirely dependent upon the tender mercies of the contractor. Knowledge of coal tar and its products with the parent industry, appears to be locked behind "combination" locks, as is many another enterprise in which the public is vitally concerned. This is not an enviable position, and should not be accepted as final by any engineer in any pursuit. Municipal testing labora-



LAYING BITULITHIC PAVEMENT ON WEST HURON STREET, PONTIAC, MICH.

tories, to be sufficient in the various departments, would be too expensive for the smaller cities. But it is to be hoped that larger cities may some day recognize that brains are an article of commerce, and that they are just as valuable to the public as private corporations. And why should not engineers be something more than givers of "lines and grades," the popular notion, but be regular recipients of this expert knowledge, and givers of sage advice to franchise controlling bodies. With this conception his value to the community cannot be over estimated. Yet, what inducement is there for him to study these larger problems, as a municipal agent, unless his love of knowledge is his own sufficient reward. But this subject, so full of possibilities, is not my thesis.

THEORETIC DISCUSSION

The foundation of this pavement is patterned after that of the old tar macadam pavements, which proved to be so very durable. Some recommend a concrete base, with the surface laid directly upon it, and others a concrete base with three or four inches of stone upon the concrete. The first does not obviate any of the difficulties of the sheet asphalt, and the latter would appear unnecessarily expensive. I am of the opinion that a broken stone base, thoroughly rolled and compacted is the best. It gives ample drainage, and more body to the pavement, as the wearing surface and base are monolithic. It will not be so easily resurfaced, but this is not of great importance. I think the claim made by some of the promoters, that the stone are rolled with a heavy roller, while the concrete is only tamped in place; and, therefore, the stone is better, is not a good one. The stone base makes the pavement more elastic in its application. For, in many places, where stone are dear, other material could be



THE PAVING AS SHOWN COMPLETE EXCEPT BETWEEN TRACKS

used, and in other places where travel is light and there is a well compacted gravel roadway, a base of three inches of stone would appear sufficient. Thus, by paying more attention to the subgrade the base could be made to suit local conditions. When the surface becomes worn, care should be taken to prevent water soaking through to the foundation. If there is not adequate supervision of the back-filling of the trenches, cut through the pavement concrete could be required over the trench before putting back the surface.

The wearing surface, as previously stated, must have hardness, toughness and cementing properties to be durable. The bituminous composition which is to furnish this cementing property, must possess the following characteristics:

1. Strong adhesive power, so that the pounding of horses'

feet will not loosen or pick up the stone, and so that concentrated loads will not shear or shift the material.

2. It must have cohesion, so as not to easily grind up or wear out under travel.

3. It must be elastic, to allow for expansion and contraction.

4. It must have a sufficient range of flexibility, so as not to become sticky, or shift in summer or to crumble and crack in winter.

5. It must be impervious to water.

6. It must not disintegrate under water.

7. And it must contain the foregoing properties, sufficiently long, to allow a nearly even and uniform wear of the pavement.

The above requirements, from one to six inclusive, have already received a thorough test in actual practice. More time is yet required to demonstrate the seventh condition. The sixth, an important factor, is fully secured in the coal tar pitch, as it appears to be a well known fact of chemistry, that "it is wholly insoluble in water." And because it has this property, it will be less pervious to water. But the lower temperatures of manufacture of the bitumen would, perhaps, give it more volatile matter and thus counteract the above effect.

The claim that the gradation in the sizes of stone, gives the metal aggregate inherent stability, and thus permits the use of a softer and therefore more durable bitumen, is unquestionably a good one. The softer bitumen would give greater adhesion, cohesion, elasticity, and range of flexibility than a hard one. This gradation in the stone, reducing the voids to 10 or 12 per cent., gives much less area of stone to be coated, therefore less of the surface of cement exposed, than with the sand mixture. And, if the same amount of pitch were used, which I see no reason for doing, the film of pitch would be much thicker around the stone, and therefore better. It appears to be true of asphalt pavements that those with well graded sand are more durable. And also that the softer the bitumen used, the better the pavement.

The question whether asphalt or coal tar pitch would best fulfill these requirements is a question for the specialist. The fact that the patent under which the bitulithic pavement is laid, permits the use of "coal tar, coal tar pitch, asphalt, or a mixture of them or other equivalent bituminous material," together with the fact that asphalt is cheaper than the pitch, would indicate that the manufacturers of the pavement have more confidence in the coal tar distillate. Mr. F. J. Warren's statement, which is almost identical with Mr. Dow's, is, that all the older coal tar pavements which are in existence to-day, were laid with straight refined coal tar. Samples of bitumen have been taken from these old pavements and their physical and chemical qualities determined. And Mr. Warren states, "the pure bitumen after over thirty-three years' use is soft and pliable."

A study of a few of the twenty patents issued to this company will show that a thorough investigation of asphalts has been made, with the possibilities of combining a hard asphalt with softer asphalts having an asphalt rather than a paraffin base and thus producing a softer cement. Also the possibilities of the use of correct proportions of lamp black, or

free carbon, to obtain a greater flexibility with change of temperature. Mr. Warren says, in a personal letter, after explaining the possibilities of the carbon theory, that he hopes to produce a paving material superior to and more permanent than anything which has been produced. The company has developed something like twenty-two methods for determining the quality of the cement, and others for determining the condition of the stone, and the amount and character of the voids in the stone. Thus, there appears a far more thorough and scientific study of all classes of bitumen and bituminous mixtures than has been known heretofore.

Theory alone is frequently misleading, but theory supplemented with practice, is the only true guide. In my correspondence I received replies from 75 per cent. of the cities which have this pavement in use. [These replies were printed in the February number.—EDITOR.] The questions were such as to bring out weak points as well as strong ones. And, in selecting statements for the table, I quote verbatim, as nearly as possible, the strongest statement both for and against the pavement.

A request was made of the various asphalt paving companies to inform me of any failures or dissatisfaction with the pavement. The few reported failures were investigated, and the results are given in the table. (See February number.) These statements are mostly from engineers in their respective cities, or, in some cases, those of the mayor or street commissioner.

There is one feature which the table does not bring out sufficiently, that is the general approval of this pavement for steep grades.

Municipal Engineering assigns values to the bitulithic pavement as follows:

	Ideal.	Bitulithic.	Asphalt.	Brick.
Tillson's table	100	82	76	67
Baker's table	100	88	77	70

These values could be altered slightly, perhaps, but in general, as far as I am able to determine, they appear correct. It is of course understood that these ratios are not absolute, but that they must vary to suit local conditions, and these local conditions should be studied with the knowledge of the advantages possessed by various paving material to suit different conditions.

In conclusion, I wish to say that I began my correspondence with different cities, with the expectation of finding some dissatisfaction with the pavement; but there appears to be general, and in many cases, enthusiastic approval.

Conservatism is a commendable attribute, but when a method of construction receives such universal approval from practice and profession alike, conservatism must give way to commendation.

The Commissioners of Public Improvements of Kalama-zoo, with Mr. G. S. Pierson, M. Am. Soc. C. E., as their consulting engineer, gave this pavement a most thorough and able study, and as is stated in their report, they left nothing undone which they could or should have done to inform themselves upon this important subject. And there has been no time since when they would reverse the opinion then expressed, that they had selected the best pavement for their city.

I close by quoting the statement of Mr. A. W. Dow, Inspector of Asphalts and Cements for the District of Columbia, "That this pavement gives promise of being one of the most successful constructions that has even been attempted in road building," and in the letter confirming the above statement, with others, he says: "I feel I have never spoken too well of this pavement."

THE WIDTH OF STREETS

IN reporting on the paving of a certain street in Mobile, Ala., City Engineer Hazlehurst took up the discussion of street widths in sections where roadways are to be permanently improved. He said that the idea that the proper width of the roadway should be dependent on a fixed ratio between the width of the roadway and the breadth of the street itself was erroneous; local conditions and the extent and character of the present or prospective traffic should determine the width of the roadway. The experience of other cities should be studied in interpreting the local conditions and a standard adopted as a general requirement, to be modified according to the local conditions.

It has been found that three-fifths of the width of the usual commercial street will afford sufficient space for traffic. In residential sections a width of roadway for the passing of two wagons is sufficient and a twenty-foot road is all that is necessary, but, to provide for future traffic and the occasional turning of teams, a twenty-four-foot roadway is better for forty-foot streets, and twenty-six-foot roadways for streets sixty feet between properties, except that four feet additional should be allowed for streets containing a single line of street railway.

Regarding the reduction of the width of roadways in streets already laid out, Engineer Hazlehurst said that the

objections come from those who cling to old established usage and who argue that, having never seen it done, it must necessarily be wrong. Mr. Hazlehurst gave many reasons for sub-dividing the streets into narrow sidewalks, grass-plots and reduced roadways. Thus, it reduced the cost of paving on both roadway and walk; there is a continued decreased cost of maintenance, cleaning and sprinkling; as all pavements reflect heat in proportion to their areas, cooler streets are secured; a well-kept grass plot adds to the appearance of the streets and permits the growth of trees and shrubbery; the gas, water, sewer and other mains and conduits can be laid under these grass plots. As an indorsement of his views on this subject, Mr. Hazlehurst quotes an experienced engineer thus:

"I have been an advocate of narrow roadways for streets of light traffic for many years, and not a few others have done what they could to prevent the wanton waste of money in building wide pavements where there is neither need, nor even valid excuse for them.

"The public, who take little interest, as a rule, in municipal public works, may be excused for their thoughtlessness or unconcern, but what about the municipal engineer, who is supposed to keep abreast of the times, and to look after the interest of the people who employ him?"

BRICK PAVEMENT IN ILLINOIS

Some Observations by the City Engineer of Pekin—Sub-Grade and Foundation, Questions of Importance—Discussion by Prominent Brick Makers

At the twenty-sixth annual convention of the Illinois Clayworkers' Association, held at Danville, Ill., January 5-6, an interesting paper on "Civic Improvements" was presented by Mr. D. H. Jansen, C. E., of Pekin, Ill. After discussing the absurdity of the special assessment law of the State, Mr. Jansen went on to say:

"I would now like to take up a little of your time in discussing brick and asphalt, the two materials most prominent to-day in the public eye in Illinois. Comparing these materials, we find that brick excels asphalt in cheapness of construction, durability and good foothold. It is superior to asphalt in ease of traction in hot and slippery weather, and inferior in cleaning. It is less expensive to maintain, especially in small cities, where repair plants for asphalt are not maintained. Studying these facts, we wonder why some people select one, and some another pavement. We must admit that, to the public eye, a well constructed asphalt pavement looks more pleasing than a pavement built of brick, and I believe that this fact alone decides in favor of asphalt in a majority of cases where asphalt is used. Then, too, there is something seductive in the

five-year guaranty the asphalt people are willing to give, but if we look into the case of this guaranty demanded of the asphalt people, isn't it a fact that people demand it because they are afraid of the permanency of asphalt, and I believe they have a right to be, because it is questionable to-day, if you use asphalt, whether you will get a good or bad job, as many cities have found to their sorrow? On the other hand, people know exactly what to expect from brick as a paving material. They know if it stands the laboratory tests it will stand the actual tests, and it is a known quantity that has been tried and not found wanting.

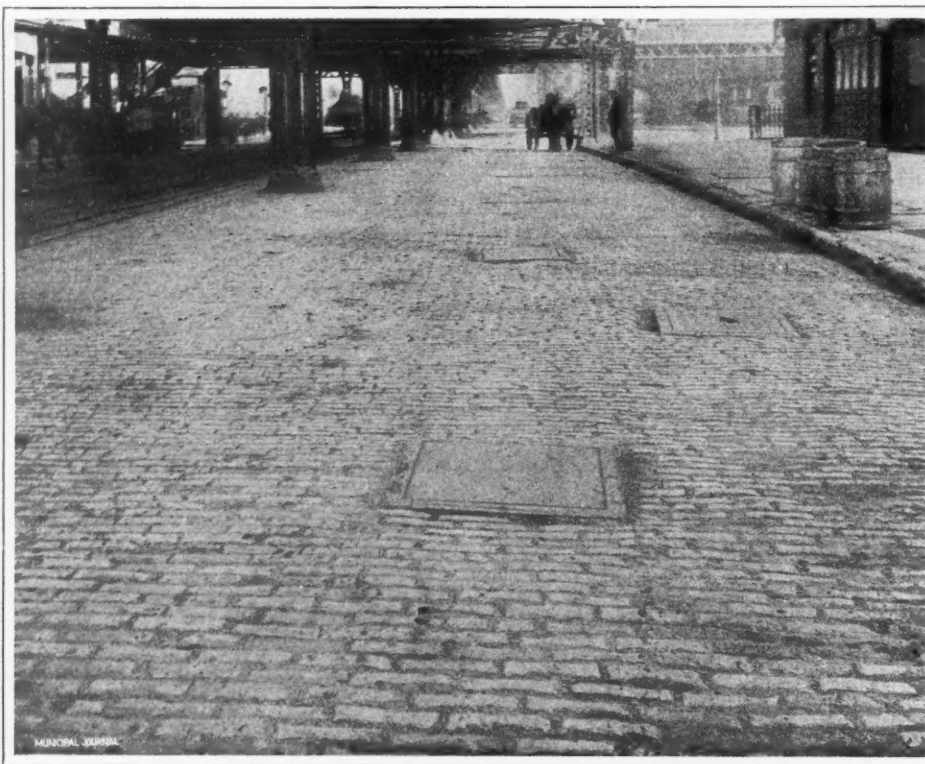
"The question of maintenance of an asphalt pavement also decides many officials in favor of brick. We know that it

is easy to repair brick pavements, because it can be done by local men, but when we come to repairing asphalt streets, we find that we must get a railroad repair plant, get experts to do it, and that it costs an excessive amount of money. Do you wonder, then, that when I wrote to the city engineers of twelve representative cities in Illinois, as to the amount of brick and asphalt pavement laid up to the present time, I found in summing up the totals for all replies received, that there are 138 miles of brick pavement and sixteen miles of asphalt pavement, and I believe this represents the opinion of the public to-day as to the merits of the two pavements. If the public wants a luxurious pavement, give them asphalt, and if they want an economical pavement, give them brick.

SPECIFICATIONS

FOR BRICK PAVEMENTS

"Now I will endeavor to discuss a few features of brick pavements, and naturally the first subject is specifications. The specifications adopted by the N. B. M. A. are the best that I have seen up to date. One feature of these specifications is still under fire, and that is the question of an absorption test for paving brick. Engineers are divided on this point, and you still find that most paving brick are subjected



NINTH AVENUE, ONE OF THE BUSIEST STREETS IN NEW YORK, PAVED WITH PYROGRANITE BRICK IN 1891—AS IT APPEARS AFTER THIRTEEN YEARS' USE

to this test. I do not believe it is necessary, as I think the Jones-Talbot rattler shows all the defects that the absorption test does, and some not shown by the absorption test. We know that either will detect a soft brick, that a good brick will stand the rattler, but may not stand 2 per cent. absorption test, and we further know that the rattler will detect an over-burned brick but the absorption test will not. The rattler shows definitely the qualities of the different bricks, but the absorption test shows little if any difference in the brick that is burned just right and the brick that is over-burned. Why not, then, do away with the absorption test? Ought we not in fairness to the public, the contractors and ourselves, make our specifications as simple and concise as

possible and do away entirely with everything unnecessary?

THE SUB-GRADE

"There is one feature in the construction of pavements that needs particular attention and care, and that is the sub-grade; it must be thoroughly drained, and must be well compacted, and ordinary methods often fail to accomplish the last result. Take a business street as an example; the street has probably been dug up to receive water and gas pipes and sewers and the dirt roughly tamped back or probably not tamped at all. It is then traveled over a few years and the people want a pavement. The travel has made a crust two or three feet thick over the trench, and one foot of this is probably taken off to get to sub-grade for the pavement, and there are no visible signs of the trench; the street is rolled lengthwise and the pavement constructed, and in a year we have a sag; the roller has failed to accomplish expected results. In order to remedy this we can adopt any of the following methods:

to a foundation composed of six inches of concrete with natural cement, and it is far preferable. Gravel should be used, as it contains about 35 per cent. voids as compared with 45 per cent. voids in broken stone, and, therefore, takes less mortar and is cheaper.

"In conclusion, I wish to say that the thing that is worrying engineers to-day in the matter of brick pavements, is not the question of getting good brick, as we have plenty of them in Illinois, but rather the question of construction. Would it not be a good idea if manufacturers of paving brick would try to guard the engineer a little and at the same time protect themselves by refusing to sell brick to contractors who do poor work, and who consequently injure every department connected with the business? Give us good construction of brick pavements and I prophesy that brickmakers can continue to exult for a long time in the fact that their product still holds the lead."



CLAY AVENUE, NEAR 164TH ST., NEW YORK, PAVED WITH PYROGRANIT BRICK TWO YEARS AGO—THIS SAME BRICK WAS USED FOR BRICK PAVEMENTS IN HAVANA, CUBA

Roll the street crosswise with the roller; locate the trenches and tamp by hand; or get a roller which is divided into one-foot sections and give them enough vertical play so each can act separately on the ground it rolls. I believe bad sub-grades are the cause of most failures of brick pavements, and we must obviate it as much as possible.

"The question of using concrete for a foundation is one that should be governed entirely by local conditions. On sandy soils, a two-course brick pavement will stand as well as concrete and brick, and on residence streets six inches of broken stone or gravel give a very satisfactory foundation; in some cities with sandy soils, one course of brick on a few inches of cinders has given good results. If concrete is used, make it from Portland cement, sand and gravel, where gravel can be obtained on an equal basis with broken stone. The present price of Portland cement makes a four-inch concrete foundation with Portland cement about equal in cost

DISCUSSION OF THE PAPER

In the discussion that followed, several valuable points were brought out. Mr. J. G. Shea, of Danville, Ill., said that nearly all the bad places in the streets were caused by the digging of trenches and the improper laying of the pavement afterwards. He said the best way was to take the dirt out and fill up with gravel. No depression would then occur.

Mr. Jansen was complimented by Dr. A. L. Converse, of Springfield, who said that the paper should have a wide circulation. He said in part:

"If we can succeed by some process in getting good foundations and good fillers, the brick men will have little to fear in regard to brick pavements. I am satisfied that even a comparatively poor brick (the better the brick, the better the pavement always) but a comparatively poor brick will make a good pavement if properly laid, and an A No. 1 brick, unless properly laid, will never make a good pavement. The

great trouble with the majority of pavements is the street improvements which take place afterward, and sometimes before, the pavement is laid. I believe a good concrete foundation is the best foundation. I do not believe it possible to make a first-class foundation in many of our Illinois towns, without having something that will be self-supporting and solid. I can see plainly that some of the smaller towns, where the traffic is light, can get along with a light foundation. The other thought he brought forth is one I have been observing to some extent ever since I have been selling brick, but I do not know just how far to go. That is, in regard to revising price or raising prices on men I know will do inferior work. I generally do the best I can toward finding out who will do good work, or work that is satisfactory to the city. I am surprised that some brickmakers and contractors seem to think when a job is off their hands that it is all there is to it. The National Brick Manufacturers' Association's method of putting down a brick pavement is a decided improvement over what it used to be, and I do hope that all the engineers will familiarize themselves with what constitutes a good brick pavement."

The question of a cement filler was touched upon by Mr. W. S. Purington, of Galesburg. He said, "I do not know

whether Mr. Jansen recommends cement filler, but it is the thing to use. The suggestion was made among some brickmakers in a trip I made recently that we all agreed to, and that was to sell our brick much cheaper provided they would use a cement filler, and I think we should every one of us insist on specifications being drawn up providing for the use of a cement filler."

Mr. J. W. Shea said that engineers were not unanimous regarding the fact that the cement filler was the best. Where the grade was steep, they preferred the sand filler. Regarding the foundation, he considered the concrete foundation the best of all as has been proved since the first brick pavement was laid. In Danville, two course brick pavements have been in use and prove very satisfactory, as in other cities of the State. On them the concrete would be fully as good, because of the good natural foundation. While the cement filler has been used in many cities, it has been satisfactory where the grade was flat, but with a steep grade, the sand is better.

At the suggestion of Mr. T. A. Randall, of Indianapolis, editor of the *Clay-Worker*, the paper of Mr. Jansen's is to be printed in pamphlet form in order, as Mr. Randall remarked, that every city engineer in the country may read it.

NATIONAL BRICK MAKERS MEET

LARGEST in point of numbers and largest in enthusiasm was the annual convention of the National Brick Makers' Association, which was held in Cincinnati, O., on February 3-6. Eighteen years ago the Association was organized in Cincinnati, while this year over 500 attended the sessions at the Grand Hotel.

At the first session held fifteen new members were enrolled and then Corporation Counsel Hunt, in the absence of Mayor Fleishman and Vice-mayor Gordon, welcomed the visitors. On behalf of the Association, Mr. J. M. Blair welcomed the delegates to the city. The retiring vice-president of the Association, Mr. G. H. Shellenberger, of St. Paul, responded. The report of President R. G. Eisenhart, of Horseheads, N. Y., discussed all conditions of the trade, stating that the Association had not met to regulate prices or fix the price of labor, but subsequent unexpected events proved that this was not strictly the case. He said the purpose of the meeting was to discuss ways to cheapen the cost of production and improve the grade of goods. He favored the good roads bill and hoped for its passage.

Mr. John W. Sibley, of Birmingham, Ala., treasurer of the Association, announced that the Association had secured several hundred feet of space at the St. Louis Exposition and that nearly every member is to have a display. Following the report of the treasurer, the following officers were elected: President, W. S. Purington, Galesburg, Ill.; first vice-president, J. M. Blair, Cincinnati; second vice-president, Wm. P. Blair, Terre Haute, Ind.; third vice-president, A. R. Root, Princeton, N. J.; secretary, Theodore Randall, Indianapolis; treasurer, J. W. Sibley, Birmingham, Ala.; member of committees on technical investigation, W. D. Richardson, Columbus, Ohio.

The first business speech of the session was made by Mr. D. V. Purington, of Galesburg, Ill., who took for his topic,

"Our Record of Progress—Eighteen Conventions, by One Who Has Attended Them All." He spoke of the growth from fifty to 500 members, and told how the influences of the Association could be extended. Mr. J. H. Chambers, of Philadelphia, talked about "What Machinery Men Have Done for Brickmakers." Dr. A. L. Converse, of Springfield, Ill., followed with "What Brickmakers Have Done for Machinery Manufacturers." All papers were well discussed.

A paper on "The Face Brick Problem," was read by Mr. J. J. Koch, Shawnee, O. Professor C. F. Binns, Alfred, N. Y., contributed, "Out of the Beaten Path," and Mr. A. F. Smith, New Brighton, Pa., read a paper on "Mechanical vs. Hand Method of Handling Clay." City Engineer W. E. Gunn, of Covington, Ky., read a paper on "Brick Pavements." A number of other papers were read and discussed by members and all had the opportunity of talking. While the men were discussing these papers, the ladies were being escorted to various points of interest about the city. A banquet was held on the evening of the first day, and an informal reception and musical entertainment on that of the second.

An interesting feature of the last session was the report of the Committee on Exhibition of Clay Products at the St. Louis Exposition by Professor H. A. Wheeler, of St. Louis, who illustrated his remarks with lantern slides. "Sand-Lime Brick from a Brickmaker's Point of View," was the title of a paper read by Mr. Daniel P. DeLong, of Glens Falls, N. Y., and it received considerable discussion. Mr. W. B. Ittner, of St. Louis, illustrated his paper on "The Use of Brick," by the lantern. Mr. Phil J. Hodgson, of Wheeling, W. Va., discussed the financial end of brickmaking, and Mr. H. J. Mathews, of Birmingham, Ala., talked of the manufacture of brick from Southern shales. "The Manufacture of Salt Glaze Brick," was the title of an interesting paper by Mr. Isaac Hardy of Worksop, Eng.

ATLANTIC CITY'S ARTESIAN WELL SUPPLY

Being Largely Increased by Air-Lift Pumping Plant—Other Improvements Completed and Projected

By Kenneth Allen, Sup't of Water-Works

THE greater part of Atlantic City's water supply has been derived from Absecon Creek—a stream flowing through cedar swamps and hence, while quite pure as regards turbidity or bacteria, it is rather highly colored and liable to prejudice visitors to the city.

The Water Department has experienced much trouble in keeping up the supply from Absecon Creek because of numerous breaks in the dam, banks of the canal, etc., which would have threatened seriously the water supply of the city, had not the artesian well supply been available. Trouble of this character was always imminent and caused great anxiety. Were it not for the provision already made of increasing this supply of artesian wells and replacing the canal by a closed conduit, the Department would be in a very hazardous situation. For several years about forty-four 4-inch wells, twenty-four feet deep, and a 10-inch and a 4-inch well, each tapping a stream lying about 100 feet below the surface, have furnished a small, but varying, quantity of water by natural flow, (probably from one-half to one million gallons per day). Waste by consumers is moderate because of the meters. There is no control over waste on public services.

To test the capacity of the lower water-bearing stratum, a one million gallon Worthington duplex pump was set up over the ten-inch well, and the discharge, measured by a weir, with a suction lift of about nineteen feet, held steadily at 580 gallons per minute for six hours. This, with other general information regarding the local conditions, warranted the Department in letting a contract for ten ten-inch tubular wells to Thomas B. Harper of Jenkintown, Pa. A four and one-half-inch test well was also sunk 325 feet to yet another water bearing stratum; but, although there was a free discharge at the surface, the test under suction was not satisfactory and it was concluded to adhere to the plan of tapping the 100 foot level.

It was planned to sink 10 wells in two rows intersecting approximately at right angles, but tests made as they were driven caused an abandonment of the extreme wells to the west and a somewhat closer spacing (150 feet apart) on the line to the north than would in general be advisable.

Each well had twenty feet of Cook strainer on the bottom and eight of them had, in addition, an ordinary gauze strainer twenty feet in length located from about thirty to fifty feet below the surface, tapping the upper and coarser portion of the same stratum.

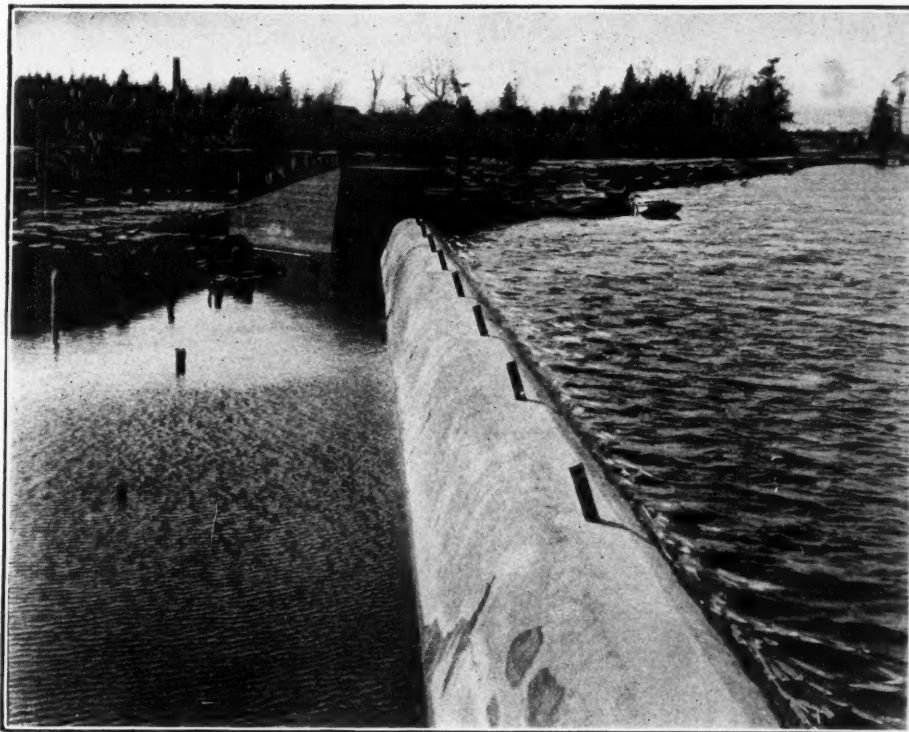
These wells delivered on preliminary tests from 240 to 400 gallons per minute, except Nos. 1 and 2 which gave but about 150 gallons each. The bottom of well No. 2 was placed forty-three feet below the surface and the average of the other nine, 101 feet down. The work was completed in April last at a cost of \$1,142.03.

PERMANENT AIR LIFT PLANT INSTALLED

The results from these preliminary tests were considered satisfactory and bids were invited, based on a capacity of 3,000,000 gallons a day and a lift of thirty feet, either for an air-lift plant, or a centrifugal pumping plant to be run by an impulse wheel or

electric motor. Owing to the depth and consequent cost of a long suction main, the lowest bid was for an air-lift plant and was made by the Pneumatic Engineering Company, of New York. The Currie Company, of Atlantic City, received the contract for a vitrified clay discharge main to a small reservoir known as the "well basin."

The two deepest of the old wells were connected up with the ten new ones by 2,000 feet of air pipe and the effluent is carried off by 1,525 feet of discharge mains, of six to eighteen inches in diameter. The Department constructed a seven-foot concrete gauging weir at the entrance of the discharge main to the well basin. The air is compressed by a duplex Rand compressor, cross-compounded on the steam

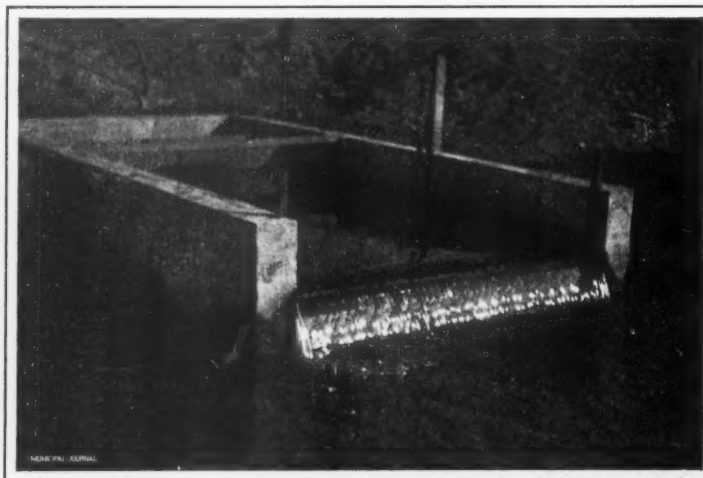


CONCRETE WEIR—ABSECON RESERVOIR

end, to about twenty-eight pounds per square inch. This lifts about 3,000,000 gallons per day about twenty-four feet to the top of the casing by actual measurement. By means of a supplementary valve in the air-pipe, operated from a wheel at the well-head, air may be admitted just below the upper strainer and the air pressure reduced accordingly.

While a good deal has been done in the way of improvements to the water supply, we have urged that a number of further changes be made to secure a better water supply. The water from the Absecon Creek should be treated to remove the color and ensure protection from contamination in the future. The experience of Ithaca, N. Y., and Butler, Pa., should serve as warnings of what may result if the Absecon water is not treated before entering the city mains.

Another improvement should be the construction of a concrete reservoir which would ensure an adequate supply in case of accident to the works on the mainland or meadows. The fact that the large mains of the supply run parallel with the tracks of the railroad and but a short distance from them, makes possible the cutting off of the water supply should an accident occur on the railroad so as to damage the mains. Then, too, a new pumping station should be installed and low-lift pumping machinery be added to the Absecon station. A number of improvements are now being made, the most important of which is the construction of two miles of forty-two-inch conduit of Washington fir to supplant the canal which now conveys the Absecon Creek supply from the reservoir to the pumping station.



CONCRETE WEIR WITH ADJUSTABLE BRASS CREST PLATE AND HOOK GAUGE TO MEASURE WATER FROM WELLS NOS. 3-12



VIEW OF WELL-HEAD—*a* AND *b* ARE VALVES ON $\frac{1}{4}$ -INCH AIR PIPE TO DETERMINE LEVEL OF GROUND WATER

SUCCESS OF SOUTH NORWALK'S ELECTRIC PLANT

THE eleventh year of operating the municipal electric light plant at South Norwalk, Conn., finds the plant in a fine condition and on a paying basis. During the past year a number of improvements have been made and the meter system has been introduced. The open arcs, engines, and generators of the original street lighting system, after eleven years of service, which more than saved their cost to the city, have been replaced by modern machinery, and a higher system of economy in operation is assured. It is the purpose of the Electrical Commissioners to use their discretion in the placing of meters, only those that have proved wasteful being compelled to instal them. Many of the merchants are finding that the city service is much better and cheaper than that of private concerns and advertise the fact that they use city service.

The resources of the plant to date of the last report are \$88,140.45; the total debt, \$71,500; and the surplus, \$16,640.45. The total operating expenses for the year were \$21,067.54; the income, \$25,494.17; and the profit, \$4,426.63.

The street lighting service has a capacity of 130 arcs, although but 108 lamps are in use. These lamps are lighted an average of 2,764 hours a year, or 339 nights. The average yearly rate charged per lamp is \$60; the average cost per lamp per hour, \$0.21; and the average watts per hour

supplied for 1 cent, 180. The incandescent lamps used for lighting walks under bridges are lighted 4,000 hours per year, and the rate charged for each is \$5.04 per year.

The commercial lighting capacity of the plant is 6,600 sixteen candle-power lamps, there are thirteen miles of mains, 5,030 incandescent lamps in service, and 166 h. p. connected in motors. The total kilowatt-hours generated during the year was 524,535; the average income per kilowatt-hour was \$0.04858; the average cost was \$0.04016; and the average gain, \$0.00842. The average pounds of fuel burned per kilowatt-hour were 8.53, and the average income per ton was placed at \$12.75. The average watts obtained from each pound of fuel were 119.5, and the total number of private consumers was 285.

The meter rates for lighting and power, up to one-fifth horse-power, are 10 cents per hour for the first 100 kilowatt-hours; 8 cents for the second 100 hours; and 6 cents for 300 and over. A rebate of 10 per cent. is allowed on bills paid before the tenth of the month. If the city had been compelled to pay the rates charged the city of Norwalk for lighting during the years the municipal plant has been in service, the cost over that by the municipal plant would have been \$27,589.75. To the efficient management of Superintendent A. E. Winchester, is largely due the success of this plant.

WOOD PAVEMENT ON NEW YORK STREETS

Specifications Exact—Remarkable Durability Demonstrated Under Heaviest Traffic—Truckmen and Other Drivers Praise It

By Frederic Arnold Kummer, C. E.

THE only pavement which answers every requirement for paving the heavily traveled down-town streets in New York City seems to be the improved wood block pavement. A number of contracts for the use of this pavement have been let in Greater New York during the past year, notably, Clinton avenue, Java street, Monroe street, State street, Gallatin place, Meeker Avenue Bridge, Washington Avenue Bridge, Metropolitan Avenue Bridge, Union street, and the Williamsburg Bridge; Tinton avenue in the Borough of the Bronx, comprising about 8,000 square yards in one contract; and Ninety-eighth street, Twentieth street, Lenox avenue (between the car tracks) and Warren street in Manhattan Borough. The Brooklyn work was all completed by the close of the year, including the Williamsburg Bridge, which was finished under great difficulties owing to the severe weather, but is now open to traffic on both roadways. One block on Warren street was completed. The contract of the United States Wood Preserving Company includes that portion of the street from Broadway to Greenwich street, carrying a very heavy traffic, and paved at the time the contract was let with granite blocks which had become badly worn and rounded so that the street was rough, unsanitary, noisy and difficult of traction as well as being quite slippery owing to the polished and rounded surfaces of the granite blocks. One block of the street, from Greenwich street to West Broadway, was completed in December. This block is laid with a 4-inch creo-resinate paving block upon five inches of concrete, the blocks being set in a cement mortar bed in accordance with the following specifications:

SPECIFICATIONS

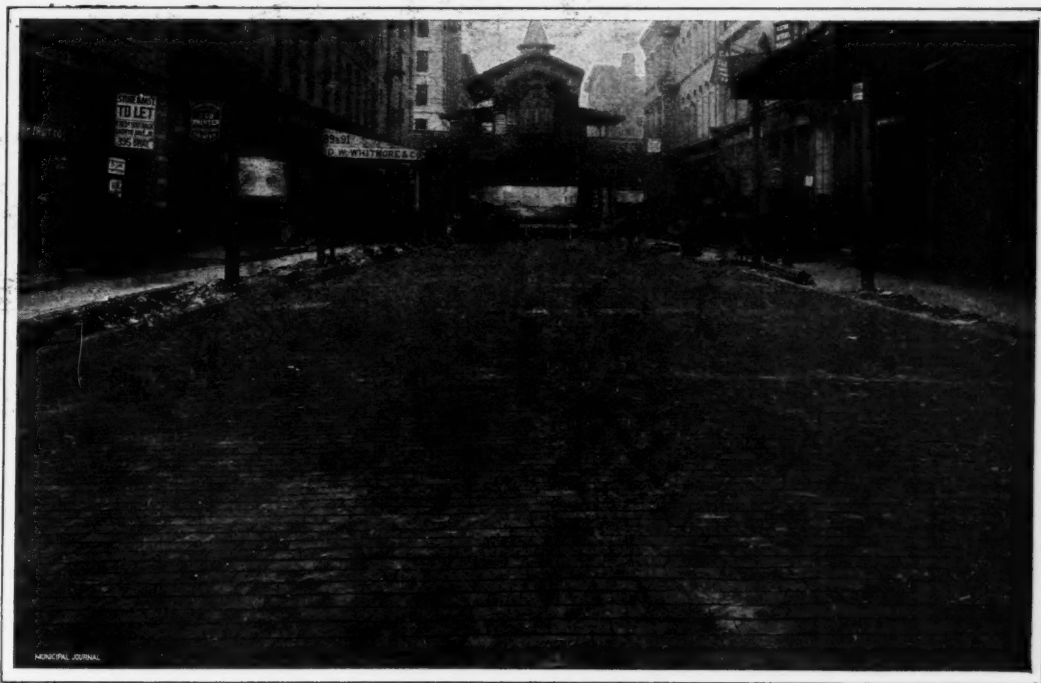
Upon the surface of the concrete foundation so laid, a mortar bed composed of one part of slow setting Portland cement and four parts clean sharp sand was spread. This mortar bed is one-half inch thick, and it will thus be seen that, added to the four and a half inches of concrete, the actual base of concrete secured is really five inches. This mortar was thoroughly mixed as the work progressed and spread

upon the wetted surface of the concrete and was then brought to a true bed with a wooden template. On to this bed the wooden blocks were quickly laid and lightly tamped with a wooden rammer until they presented a true and even surface; this ramming being done not upon the surface of the blocks themselves, but upon two-inch planks laid upon the paving surface.

After being so laid the joints between the blocks were filled with Portland cement grout.

After the street was finished a petition was presented to Borough President Ahern, signed by practically every property owner and team driver on the street, setting forth that the street had proven highly satisfactory and that the petitioners would like to see its use extended upon the heavily traveled down town streets of New York.

The blocks laid on Warren street were what is known



CREO-RESINATE WOOD BLOCK, WARREN STREET, NEW YORK

as grooved blocks, being cut away for a depth of one and one-half inches between their faces so as to form a one-quarter-inch joint between the blocks, below which joint the blocks butt tightly together down to the concrete base. This wide joint was filled with Portland cement grout and it is because of these joints that the pavement, which is on a considerable grade, has not been slippery. A similar piece of pavement was laid on Boylston street in Boston, in 1901, and has shown no wear to date, has never had any repairs, and is in perfect condition.

The astonishing durability of pavements of this char-

acter makes them pre-eminently suited for the most heavily traveled streets, streets upon which even granite block has been found to give poor results.

REMARKABLE DURABILITY

The oldest pavement, which was the first laid by the company, is on Tremont street, Boston, laid in the year 1900. The street is to-day, although carrying a very heavy travel, in exactly the same condition as when it was first put down. Measurements of blocks removed from this street after two years of service show less than one-eighth of an inch of wear in two years, giving a life of over sixteen years to each inch in depth of the block.

In order that these results might not be solely dependent upon records from Tremont street, Boston, exactly similar tests were made by removing blocks from Main street,

First, in the fact that they are treated throughout to the heart with twenty-two pounds of preservative mixture to the cubic foot, instead of ten or twelve pounds, as is the general practice.

Second, the character of the wood employed is the very best, being all heart Georgia pine.

Third, the waterproof nature of the mixture employed, unlike plain creosote oil, excludes all water, prevents the block from swelling and its surface from becoming soft and spongy, thus reducing wear to a minimum and rendering the block absolutely sanitary, because street filth is not absorbed, as well as because the mixture itself is a powerful germicide.

CLAIMS JUSTIFIED BY TESTS

The original claims made for this pavement, which have



ONE OF THE ROADWAYS OF WILLIAMSBURG BRIDGE, PAVED WITH CREO-RESINATE WOOD BLOCKS

Springfield, Mass., with even better results. The blocks show a decrease in depth of little over one-sixteenth of an inch in two years, a large part of which decrease is not due to wear, but to compression, the upper surface of the blocks being almost as hard as stone. A similar test of blocks in Boston after three and a half years' wear, shows the astonishing result that the wear had not perceptibly increased during the additional year and a half.

No evidence of decay has ever been found in any of the blocks laid by the company; but this, of course, goes without saying, as the blocks are so thoroughly impregnated with an antiseptic and waterproof mixture of creosote oil, rosin, etc., that decay is impossible.

It should be pointed out that these blocks differ from the ordinary creosoted blocks employed in most instances, in the following particulars:

now been amply justified by the actual test of time, are, that it is durable, smooth, noiseless, sanitary, easily cleaned, easily removed for repairs and not slippery. These claims are based upon the following reasons:

First, it is durable because, unlike any other pavement known, it does not crumble, pulverize or wear away under traffic, but simply compresses, becoming more and more solid the heavier the traffic. Its serviceable life is therefore greater than that of stone pavement.

Second, it is smooth, because it is laid with a perfectly close, tight joint, which joint becomes practically obliterated after a short time, so that the entire surface of the pavement is welded into one smooth, even, mass presenting no obstruction to the passage of traffic.

Third, it is noiseless because vehicles pass over the smooth surface without any rattle or bang, as is the case with brick

or stone, and at the same time blows from horses' shoes, instead of making a sharp metallic sound, such as is the case with asphalt, makes little more noise than would be heard from a dirt road.

Fourth, it is sanitary because the blocks themselves do not absorb street filth, because the joints are not open for the absorption of such unsanitary matter, and above all, because the blocks themselves are treated with a highly antiseptic material, namely, creosote oil, which instantly destroys germs of disease should any exist upon its surface.

Fifth, it is easily cleaned because of its smooth surface and does not differ in this respect from asphalt pavement.

Sixth, it is easily removed for repairs because the blocks can be taken up by any practical workman, and after the gas or water connections necessary are made, can be replaced in identically the same form as before at a minimum expense, and without the use of any expensive plant.

Seventh, it is not slippery on level stretches, since under these conditions the end grain of the wood affords a good foothold for horses. On grades, a special grooved block manufactured by the company is employed, providing transverse grooves across the street, one-quarter of an inch wide and about one inch deep, every three inches, giving ample foothold for the calks of horses' shoes, and being under these conditions far less slippery than any other pavement known.

With the exception of bridge work, the pavement has

been uniformly laid on a solid concrete foundation, with either a sand cushion or a sand and cement mortar bed under the block.

The pavement has also been endorsed by the United States Government, through its use for paving in the New York Navy Yard; and its superiority over all known forms of pavement for the construction of the roadways between the rails and trucks of street railroad lines is demonstrated, not only by its use by the Hartford Street Railway Company, in Hartford, Conn., and the United Electric Railway Company, of Baltimore, Md., but more emphatically still by its use on Lenox avenue and elsewhere in New York City, by the Metropolitan Street Railway Company, and in Brooklyn on bridge and other work by the Brooklyn Rapid Transit Company.

As we have so often before said, the pavement is not a cheap pavement, nor can it become so unless improperly constructed and improperly laid. But it is, in the way in which the company has manufactured and laid it, the most durable pavement, and the best pavement from every point of view, which it is possible to lay upon a street.

For the streets of down-town New York, it is pre-eminently suited and there is no question but that in five years New York will be paved, especially in its finest and most heavily traveled thoroughfares, with wood, as is the case with its sister cities of London and Paris.

MEDICAL INSPECTION IN FOREIGN SCHOOLS

MEDICAL inspection of the German and French schools differs and a French medical journal has drawn a comparison between the two with the advantage on the side of the German. The article cautions especially the inclination in France to overdo such efforts, which may lead to giving the physician a too far-reaching influence and the possibility of meddling with the matter of school instruction and in more intimate relations.

It first reviews the rules for medical supervision over the public schools of Berlin.

Every school physician has supervision over four schools, and his duties are to examine twice a year all the pupils who enter the school with reference to the senses, the spinal column, the development of the limbs, etc.; to make examination of those pupils who would be subject to receive instruction on account of stuttering or some other additional instruction; to make a quarterly inspection of the school rooms with reference to their sanitary condition; also of the health of the pupils and the presence of contagious diseases. These examinations may take place oftener if requested by the school board.

In addition, the State district physician has to inspect the local schools at least once every five years with reference to their architecture; he has also to prescribe the necessary measures in case of a threatened epidemic.

The principal of the school is required to send those pupils to the school physician whose state of health during the intervals of the official visits creates suspicion. It is especially pointed out that the school physician, according to the German rules, is not to give the sick pupil orders or prescribe

for him or her, but the parents are simply notified of the facts and receive written advice.

It is furthermore particularly important that the school physicians meet together in certain intervals, three or four times during a year. These measures are held by the French paper to be models for a reform of conditions in Paris. It appears to it indispensable, and it certainly does seem proper to have the pupils entering school examined separately by the school physician, as thereby it is possible to call the attention of the teachers from the beginning to the physical conditions of the school children. The Paris rules go further, inasmuch as the school physicians are obliged to inspect their schools at least twice a month instead of only twice every half year.

The careful execution of the medical examination of the hygienic conditions of the school is the most important part of the duties of the school physicians.

Aside from this the medical treatment of the pupils must, as far as possible, be left to the home physicians, who usually have known the children for a longer time than the school physician and therefore are better judges of the condition of their health.

In doubtful cases, the advice of a specialist shall be sought rather than to demand of the school physician a far-reaching special knowledge, which might result in making a medical experimental station of the school.

In addition, the paper proposes that the school physician should be entitled to view the condition of the dwellings of sick school children, and also to give advice concerning the architecture of schools and the division of the school hours.

SEWAGE AND GARBAGE DISPOSAL PLANTS

Lytham, England, Pumps Its Sewage by the Combustion of Refuse—Economy in Installations and Operation

By Col. W. F. Morse, Sanitary Engineer

THE subject of sewage and garbage disposal is a vital matter to the people of this country in view of the epidemics of typhoid fever at Ithaca and Williamstown last year, and now at Butler, Pa., and Columbus, O. In all these cases, the contamination of the water supply by sewage was the cause, complicated at Columbus, according to the statement of the officials of the Board of Health, by imperfect and insanitary disposal of a part of the garbage and refuse of the city.

We can learn something from the example of other countries where the crowded population has compelled the use of preventive means, which our less thickly settled areas do not yet find expedient, but which continually occurring outbreaks of zymotic diseases will probably oblige us to adopt. An official report from Lytham, a town of 10,000 persons on the south coast of England, gives some details of a later

The sewage is brought by gravity from the city mains to the pump wells, passing through screens which remove the solid parts, and is raised into the tanks by two pumps of 1,980,000 gallons daily capacity, which is nearly eight times the average dry weather sewage flow. The 10,000 inhabitants have a water supply of twenty-five gallons per head per day.

The sewage is stored until one hour after high water and then discharged twice a day on the ebb tide, and carried by currents far out beyond the chance of offence from deposits on the shore.

The power for pumping is obtained from a Meldrum simplex destructor of two grates, with a connecting steam boiler of 100 H. P. There is regenerator for heating the air employed for forced draught, a feed-water heater, a dynamo



LYTHAM (ENG.) SEWAGE AND DESTRUCTOR WORKS—BUILDINGS AND TANKS

combined installation of refuse and sewage disposal works, that is worthy of study.

The sewage of the town was discharged into the sea but, in times of heavy rains and high tides, the overflow on low grounds had very serious results. The scheme proposed by the borough engineer, Mr. A. I. Price, was to erect sewage disposal tanks which should be filled by pumping and discharged at the ebb tide. The power to be obtained from destruction of the town refuse.

THE PLANT DESCRIBED

The combined works include two tanks, or open reservoirs, of 200,000 gallons each, and adjoining, a pump-house with wells of large capacity, connected with a destructor house, to which all the town's refuse was brought. There is a stack, or chimney, fifty feet high, the whole works being of the most massive and durable construction possible.

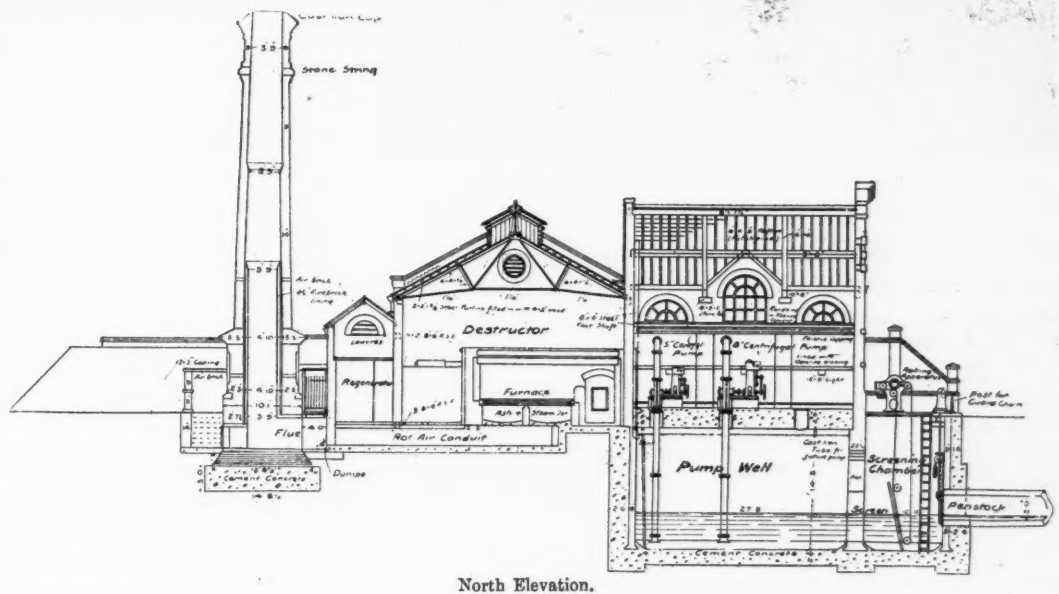
for developing power for six arcs and twenty-four incandescent lights, and adjoining are mess-rooms, bath-rooms and store-rooms. The chimney is only fifty feet high, the forced draught not demanding the usual unsightly high stack. There is a ten-room cottage for the manager on the grounds. The whole installation was within the estimate, \$50,000.

POWER FOR PUMPING FROM REFUSE

The destructor is guaranteed to burn seventeen tons of mixed town refuse per grate each day, though at present but ten tons are brought to the station. By means of the regenerator, the temperature is brought up from 1,800 to 2,000 degrees. The necessity of providing steam is of far greater consequence than of burning the greatest amount of refuse in the shortest time, as the operation of the destructor must be dependent upon the hours when the pumping power is required, and these are largely regulated by the tides. Dur-

ing the six months the plant has been running, the whole of the steam required has been obtained from the refuse.

The combined plant for disposal, which takes all the wastes of the town, presents some interesting features. The storage of sewage until a proper stage of tide for discharge, is not especially noticeable; but the provision made for the overflow of sewers in times of storm, the separation of the solid portions of sewage and their destruction by fire in combination with the town's refuse, together producing power for doing all the work without other fuel—this is the practical and economical method which will appeal to the average tax-payer and is well worth imitation in American coast towns. Where the conditions and surroundings are



North Elevation.

nearly the same as Lytham, and the garbage, refuse, and all wastes can be brought to a point near the sewer outfall, these same methods can be used and the same results secured.

MUNICIPAL THEATERS ABROAD

THE recent theater horror in Chicago has turned the attention of the country toward theaters in general and numerous cities are hurrying to "get their houses in order" that such a catastrophe may not occur to them. It would speak better for these cities if they did not need such prompting. In many cities on the Continent the operation of theaters is not left to private concerns, but the municipalities have erected the play-houses or subsidized them, and this idea is gradually spreading.

In Vienna, the Court theaters were erected by the State on State lands and consist of two buildings for different phases of the drama. The Opera House for operas, ballets, and concerts, cost in the neighborhood of \$2,548,975, while the Burg Theater, for the drama itself, cost \$68,530. These theaters are the property of the Emperor's Treasury and are maintained by the Lord Chamberlain's Department and whenever the revenue does not cover the expenses, the Emperor's Civil List makes up the difference. The Chamberlain's Department assumes no responsibility in expending the grant, which is looked after by the Hungarian government. Besides the State grants, the Royal Opera House and other theaters in Budapest receive different grants from the State and other smaller grants from the city. The provincial towns of Hungary assist theater managers by allowing free use of buildings and helping to defray cost of heating and lighting.

Belgium grants subsidies to composers, whose works are produced in a Belgium theater, and, in addition, subsidies are given to composers producing their works in French, Flemish, or Walloon. Most of the cities subsidize or own several theaters, some are given rent free, and in most of them the scenery and furniture belong to the town.

At Sophia, Bulgaria, the city is to erect a theater as soon as enough money is accumulated from the State lottery.

In France, the four national theaters occupy the buildings

rent free, but they must pay the taxes, provide for maintenance, and allow larger repairs to be made by the State without claim for damages through interruption. An annual subsidy is granted to each theater by the national parliament, warehouses are provided for storing scenery. The three largest theaters must submit to regulation of the choice of pieces produced, prices for seats, number of performances, as well as the number of new pieces per year, the minimum number of artists of each class in the company, the auditing of accounts by the Minister of Finance. In the case of the company called the Comedie Francaise, it manages its interests under State supervision, but some great work must be put on every month, or two smaller works newly written or revised, including some pieces by living authors. All the other theaters are free from State control, although other towns grant subsidies. A large number of musical societies receive encouragement from the cities by grants and medals for good work.

In Berlin the Royal Prussian Opera House and Play House receive together the sum of \$270,000 and the land on which they stand belongs to the State.

Only one theater in Rome, Italy, belongs to the city, but in Florence the municipal band receives \$300 a year and further small sums for the music stand and maintenance. Milan owns part of one of her theaters and subsidies are given others. Lisbon has two theaters owned by the State, one having been erected in 1793 by private subscriptions.

There are three State theaters at St. Petersburg and three at Moscow maintained at the expense of the Emperor. In the principal towns are theaters established by the State and in which are produced dramas for the education of the people. The prices are very low. At St. Petersburg, Warsaw and Kieff the temperance societies maintain these popular theaters, but are granted subsidies, the amounts in the first-named city totaling over \$1,500,000 during the last five years.



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NEW YORK, MARCH, 1904

The Baltimore Fire

WHAT happened in Baltimore last month is liable to happen in any other city in the United States; none is exempt. No amount of precautions will eliminate the possibility of a similar conflagration. Baltimore had a well trained and equipped fire department, but it was unable to cope with all the conditions which existed at the time to make this disaster possible. Yet its citizens have long boasted of having one of the best, if not the best, fire departments in the country. They did not believe such a calamity was possible. Other cities have been and are as self-complacent, and yet, in spite of the fact, that every needful precaution has been taken to prevent such a conflagration, it is liable to occur in any great business center, and, sooner or later, is sure to occur in other American cities. While this is being written telegraph despatches are giving the latest accounts of a conflagration which has been raging in the heart of Rochester (N. Y.) since four o'clock this morning (Feb. 26).

The fire departments are deserving only of praise, for were it not for their efficient and trained service such conflagrations would be not only more frequent but far greater.

If there is fault anywhere, it is with the persons who are responsible of the creation and enforcement of suitable building regulations. As we have pointed out many times before, the reason why our annual ash heap is so disproportionately large, when compared with European cities, is lack of adoption and enforcement of preventive measures. American cities give too little attention to the "ounce of prevention."

There is a tendency, however, to remedy this evil by giving more attention to building inspection and regulations. A group of engineering experts, including Messrs. James C. Bayles, of the *New York Times*; Perez M. Stewart, formerly

superintendent of buildings for the Borough of Manhattan; Prof. Ira H. Woolson, expert for the building department in the testing of fire resistant materials, and others, made a critical inspection of the burned area in Baltimore and most of the important buildings destroyed, and summed up the general conclusions as follows:

"The most important lesson to be drawn from the Baltimore fire is that of the exposure hazard. Rising sheer from the widespread area of devastation are a number of buildings of the so-called fireproof type. As regards a fire originating within their own walls, they are fire resistant in high degree, but by reason of their size they present a great area of wall space to the attack of flame from without. It is the unanimous opinion of the fire engineers whom we have met that had the Calvert, the Equitable, the Continental Trust, and the few other steel-frame buildings in the city been provided with efficient window protection, such as wire glass in metal or metal-protected frames, with some type of fire-resisting shutters, they would have suffered no more serious damage than the chipping of corners from the stone facing of their lower floors, and some of them would have escaped that. On the first attack of flame from without, these structures took fire at their unprotected windows on several floors at the same instant. The fire swept through them like water through a sieve, and instead of standing as invulnerable barriers to the spread of the conflagration, they transmitted it to the buildings beyond. Their burning furniture converted them into furnaces, and every window to leeward became a blowpipe nozzle, pouring out an irresistible tongue of flame to reach and consume what lay beyond. Probably no other branch of fire protection is receiving as much attention as the exposure hazard, and while the Baltimore fire adds little to what was already known on this subject, it has great value in emphasizing the fact that the safety of any building depends upon adequate fire protection from without.

"A very lively interest, amounting in many cases to anxiety, has long pervaded the minds of property owners concerning the stability as against fire of the modern steel-cage building. Most of the questions suggested by this anxiety have been answered in Baltimore for the first time. Buildings of this character were distributed through the burned district, and being much higher than those about them where exposed to assault from all sides. In every instance where modern practice in covering the steel frame and in constructing floor arches and partitions had been honestly followed, the damage suffered has been relatively small. Every form of construction recognized as weak by experts failed in Baltimore, while the several systems which past experience in experimental test or practical application have won confidence again demonstrated their efficiency. This should greatly encourage investments of this character. The knowledge of how the fire risk may be reduced to a minimum means that buildings may now be put up to which no fire can do more than suspend temporarily their earning capacity, and that the greatest damage they can suffer even in a general conflagration is likely to be well within the sum for which they can readily be insured. Probably it would not be difficult to make insurance cover loss of earnings from fire if what Baltimore experience has taught is applied in construction and equipment.

"The fire insurance engineer is probably the determining factor in all these matters. He is the product of a slow evolution, but a wide sphere of usefulness has been rather suddenly created for him within a very few years. Fire protection is peculiar in that to be efficient it must be complete. No compromise is possible, since 95 per cent. of efficient construction may be vitiated by 5 per cent. of omission, oversight, or misjudgment. In several American cities, and notably in St. Louis, the relations established between the local chapters of the Institute of Architects and the fire protection engineers, who represent the insurance interest, are very encouraging. This makes for progress, and the work of specialists in passing upon plans with reference to fire protection is giving results of great and immediate benefit. The capacity of the architect to comprehend the details of fire protection is not in question. A practical view of the matter is that he cannot better afford to specialize in this department than to work out the details of the heating, electric, and ventilating systems of the buildings in which his highest function is co-ordination and harmony."

The City's Use of Safety Explosives

THERE is a growing tendency on the part of city officials everywhere to a conscientious discharge of every duty. Whether this is due to an increased vigilance on the part of citizens generally, or to a greater desire on the part of officials to be more efficient is of little importance; it is sufficient that it is true. The change is noticeable in every branch of city administration, but particularly in the department devoted to public safety. Because of this tendency we would again call attention to the regulation of the use of high explosives within city limits.

The frequent accidents where there is loss of life and great damage to property in the use of dynamite, nitro-glycerine or some other dangerous explosives, have familiarized the general public to such an extent that in most cities they are looked upon as a public necessity; that is, unpreventable accidents that must occur unless the march of progress is checked, and the annual aggregate loss of life and property from the use of dangerous explosives has become appalling. Now that a safe substitute for these dangerous explosives has been discovered there is no longer any good reason why the others should be used, and we would therefore urge upon the mayors and aldermen of every city in the United States the necessity for taking such action as will prevent the further use of the dangerous explosives within city limits and compel the use of the safety explosives.

A year ago we called attention to the safety explosives, as then being manufactured, and urged the Municipal Explosives Commission of New York City, to recognize the merits of the new form of explosives and to make adequate provisions for their adoption in all city and contract work, as substitutes for the dangerous explosives.

Since that date, two of the largest cities in the United States—New York and Philadelphia—have followed our suggestion and commenced the use of Joveite, one of several safety explosives. In Philadelphia it has been used on the subway work and in New York City in the yards of the New York Central and Hudson River Railroad, near the

Grand Central Station. Here, as elsewhere, Joveite has been used under any and all conditions of weather and environment, with perfect success. The practical usefulness of this new form of explosive has been sufficiently demonstrated so that mayors and aldermen need have no fears of being oppressive nor of demanding something which is unreasonable when they create and pass ordinances prohibiting the further use of dynamite within city limits and making mandatory the use of safety explosives.

A brief description of Joveite will be sufficient to convince any skeptic of the reasonableness of our suggestion. While Joveite is a high-power safety explosive it is absolutely safe in use. In form it is a granular, free running powder of about the consistency of coarse corn meal. It is put up in bulk or in shells made of a waterproof material that will not tear, scale or admit any dampness. It is fired like dynamite, by means of single strength blasting caps, detonators and electric primers.

Joveite contains no nitro-glycerine or any liquids, and cannot freeze, therefore it does not require the dangerous process of thawing. It keeps in all kinds of weather and does not deteriorate or become dangerous when exposed to the highest or lowest natural temperatures. It is always ready for use in any kind of weather. In fact, it is the safest of all high explosives in handling, storage, transportation and use. If ignited confined, it burns vigorously, but harmlessly. It is not detonated by fire, concussion, friction or impact, nor by any known form of percussion except that given by another high explosive, as, for example, the fulminate contained in the usual blasting cap.

In speaking of Joveite, in his "Manual of Explosives," page 20, Courtenay DeKalb, professor of Mining and Metallurgy in the School of Mining of Kingston, Ontario, says: "Its products of explosion contain no noxious gases, so that it is peculiarly adapted to operations under ground. Its explosive temperature is 530° F. When ignited in the open it burns vigorously, but does not explode. It has been tested by the ablest explosive experts and has never proven unsafe or unreliable. It would seem to fulfil the requirements of an ideal explosive."

In addition to the foregoing it may be said that there are no accidents on record from the use of Joveite, therefore, it is not at all unreasonable to urge the proper city authorities to take steps for the immediate adoption of this safety explosive within city limits not only by the city but by contractors. By such action the proverbial "ounce of prevention" will be taken, which is better than a "pound of cure."

Chief Croker Re-instated

THE Courts have sustained the appeal of Chief Edward F. Croker and he has very properly been re-instated at the head of the New York Fire Department, as the MUNICIPAL JOURNAL AND ENGINEER predicted at the time he was so unjustly removed, more than year ago, by former Fire Commissioner Sturgis.

In accordance with charter provisions, Chief Croker recently instituted proceedings against former Commissioner Sturgis to obtain the amount of his expenses in defending himself and a judgment for \$3,066 was recently filed in favor

of Chief Croker against former Commissioner Sturgis. In speaking of this incident, the counsel of Chief Croker said:

"The judgment in favor of Mr. Croker has no connection whatever with the salary due him from the time of his dismissal from the department until he was reinstated. It is simply for expenses in fighting the decision of the former Commissioner. There is more trouble coming. Commissioner Sturgis's act in dismissing Chief Croker will cost the city in the neighborhood of \$20,000, including the salary due him. His dismissal was entirely unwarranted and I shall see that the city makes prompt restitution."

The judgment filed represents Mr. Croker's expenses for legal services, printing, courts costs, and incidentals in connection with writ of certiorari which he obtained on November 29 and the proceedings which followed in his effort to be reinstated.

Municipal Street Railways for New Jersey

PUBLIC sentiment favoring the civic ownership and operation of street railways is not, apparently, confined to Chicago, Detroit, Cleveland, Toledo, and San Francisco. This particular phase of the public ownership question has broken out in New Jersey. Hoboken has had no end of trouble with its transportation companies and Mayor Lankering has taken up the cudgel in earnest in favor of the citizens. Nothing short of public ownership and operation will suffice, the Mayor thinks, and to this end he has had a bill prepared, which provides that it shall be lawful for any city in the State of New Jersey, through its mayor and common council, to purchase any existing street railway and its equipment.

The bill also has the usual provisions for condemnation in case a corporation refuses to sell.

It proposes to have the road managed by two commissioners who will not be residents of said city, and who shall serve for terms of five years each. They shall be bonded for \$20,000 each for the faithful performance of their duties, must have had at least ten years' experience in such business, and shall operate the said railroad under the rules and regulations prescribed for that purpose by the Mayor and governing body of such city.

The commissioners shall have sole power to hire and discharge all employees, and shall have power to execute all necessary contracts and purchases.

The bill also provides that the commissioners shall have power to make all necessary arrangements to connect the said railroad system with connecting street railroads in adjoining cities and towns.

Another bill has been introduced in the New Jersey Legislature, which is evidently aimed at the Public Service Corporation that controls all the trolley systems in northern New Jersey, providing for a three-cent fare in all cities of the State between 6 and 7.30 in the morning and 5.30 and 7 in the evening.

Many corporations are so domineeringly unaccommodating that sentiment favoring public ownership and operation of street railways has grown more rapidly than it otherwise would. It is more than probable that there will be many cities with a three-cent fare and several civic street railways in operation before another decade has passed.

How to Lay Cement Curb in a Clay Soil

—, N. Y., February 20, 1904.

Editor, MUNICIPAL JOURNAL AND ENGINEER:

We have had such trouble in regard to laying cement curb and gutter that it has been decided to use sandstone in place of the cement or concrete. Our streets are paved with macadam and it is necessary to lay the curb and gutter first, but when the heavy ten-ton roller is brought alongside the junction between the gutter and macadam, the former is displaced and the whole curb and gutter forced out of alignment. The sub-soil is clay and, in cold weather, the frost makes lots of trouble in causing the curbs to heave upward. Can you suggest any remedy for the above troubles?

J. M. ROWLAND, *Alderman.*

We have heard of other places having similar trouble to that expressed in the above letter. There are several remedies. In the first place, lack of proper drainage is responsible for a great deal of this trouble. The water is retained in the clay under the curb and gutter and, as it freezes, something has to give way, viz.: the gutter. The mud formed by the clay and water has no resisting power and, when a heavy wagon backs up to the curb, the pressure on the macadam forces the latter downward and into the soft mud under the gutter, where it exerts an upward pressure that causes the gutter to heave. By laying a small drain of from three to four-inch tile pipe with open joints and connecting the same with the sewer, the water, as it soaks into the ground, will run off, too fast for the frost to follow. The clay will thus remain comparatively dry and hard.

Regarding the trouble from the road roller, this lies in the fact that the concrete or cement gutter was not deep enough. Assuming that the macadam was eight or ten inches in depth and that the gutter was about four inches thick—the usual thickness—when the roller approaches the gutter, the macadam stones are forced downward, until the clay sub-soil is compacted, and then sidewise underneath the gutter, serving as a wedge that soon causes the gutter to upheave, at the same time throwing the curb backward and out of alignment. There are two or three ways to obviate this. When the curb and gutter are laid, a trench should be dug, deep enough to permit of filling in at the back and below the gutter and curb with several inches of sand, and a drain tile laid in the bottom. The sand will allow the water to filter down to the tile at once. If the macadam is eight inches deep, the gutter should be of the same depth instead of the usual four inches. This will form an abutment against which the macadam stones may be forced with impunity. They cannot get underneath and so cannot wedge the gutter upward.

If it prove too expensive to make the gutter so thick, or if the curb and gutter be already in place, there are two ways of preventing the upheaval of the gutter. The first is to lay a mass of concrete next to the gutter, as deep as the macadam, from twelve to eighteen inches wide at the top, and sloping outward toward the center of the street. This concrete should be made with just enough cement to ensure its hardness, but with no attempt to secure imperviability. The expense will then be small and there will be no possibility of the macadam stones forcing their way underneath. The roller can then be run over a part of this concrete abutment without injuring the gutter.

The second method is to lay about three feet of deep block paving along the gutter. This will act as would the concrete abutment. Paving brick could be used, but they must be set on end, with the narrow side to the street, and be imbedded in mortar.

E. KUICHLING, *Engineering Editor.*

Personalities

—The Council of Wilmington, Del., elected Mr. George H. Boughton for City Engineer.

—At a recent meeting of the Council of Westmount, Que., Mayor A. G. Cross was re-elected.

—The elections in Vancouver, B. C., resulted in the selection of Dr. William John McGuigan for mayor.

—The Board of Aldermen, of Knoxville, Tenn., elected the following officers: Recorder and treasurer, C. C. Nelson; city comptroller, John A. McMillan; city attorney, J. W. Cutton; city engineer, T. J. Moreland.

—City Auditor Rowe, of Haverhill, Mass., was recently suspended from office by Mayor Wood on the charge of neglect of duty. The Mayor claimed that the Auditor must have been cognizant of the defalcation of one of the officials that had occurred the previous month.

—Inspector Krause, of Cleveland, O., and Building Inspector Stanley, of Indianapolis, Ind., have decided to enforce the smoke ordinances existing in their respective cities. Moral suasion has been tried with some success, but both officials think that the time has come for strict enforcement of the ordinances.

—As a result of the Iroquois Theater fire in Chicago, Mayor Carter B. Harrison was held for the Grand Jury by the Coroner's jury, as being responsible for the fire, in not seeing to it that his department heads did their duty. Exonerated by the court, he was urged by his friends to sue the Coroner for damages.

—By a large majority, Alderman Hormisdas Laporte was elected mayor of Montreal, Que., over Mayor Cochrane and another candidate. The work of M. Laporte in the council chamber, where he did good work in getting the city government in good condition and keeping it there, won the fight for him by 17,110 out of a total of 24,160 votes.

—The Supreme Court of Minnesota recently reversed the decision of the lower court in the case of Ex-Mayor A. A. Ames, who had been sentenced to prison for six years for "graft." Mayor Ames' brother, formerly chief of police, and who was sentenced for a similar term of imprisonment for the same offence, was denied a new trial and is serving his term. The court decided in the case of the ex-mayor that the indictment was faulty and the offence not proven.

—Assistant Inspector of Buildings, Edward V. Goch, of Milwaukee, Wis., has claimed that the ventilation of sewers at curb catch basins, is dangerous to the health of the city and that sewers should be ventilated above houses by standpipes. He is to obtain a patent on such an invention. Experience, however, has shown that this shaft ventilation is not successful and examinations made on the air of sewers revealed the fact that the germs contained in it do not exist in the sewage itself, and vice versa.

—In a special message to the Orange, N. J., Council, Mayor Stetson claimed that the city had made a costly error in expending money on the water system. He said that promises made at the time of installing the works, had not been fulfilled. He recommended that the City Engineer look up all the information concerning the system that is on file, before the city attempts to secure outside engineering skill in enlarging the system. The City Engineer might then be able to do the work without assistance.

—After many months of wrangling and dispute, a committee of the Council of Butte, Mont., has presented a report, charging Mayor Mullins with malfeasance and misconduct in office. The committee made an investigation into the affairs of the city with the result that it found him guilty of gross malfeasance and of flagrant violations of his oath of office by failing and refusing to enforce the laws of the city and State. The report also charged the Police Judge, and Chief of police with negligence and dereliction in office. The other officials of the city, whose official acts were also investigated, were not included in the charges.

Convention Dates

APRIL

The National Municipal League will hold its annual convention at Chicago, Ill., in April. Clinton Rogers Woodruff, 121 So. Broad street, Philadelphia.

AUGUST

The League of Georgia Municipalities will convene at Savannah, Ga., August 10, 1904. Mayor Bailey, secretary, Griffin, Ga.

OCTOBER

League of American Municipalities will meet in seventh annual convention at St. Louis, Mo., October 4-6. Hon. John MacVicar, secretary, Des Moines, Ia.

The Cleaning of a Spanish City

FOR fifteen years all of the houses, Jeres de la Frontera, Spain, even on the outskirts—except a few very old ruins—have been connected with the main sewer of the city. The excrement and waste from kitchens and chambers all go into the sewer. The street sweepings are collected in two large deposits outside of the city. There the broken glass, old clothes, rags, old shoes, bones, and tin cans are selected and packed and sent to Seville to be shipped abroad.

The green matter and waste food are given to the hogs. The remainder is left to rot and is sold to the large sugar factory here, which use it for fertilizing the land where their beets are grown. The sludge and mire are not used for fertilizer, but go into the main sewer that empties into the Guadaleto River. There are no factories that furnish waste products of any agricultural value. All their waste must be removed or collected outside ready for the contractors' cleaning carts. There is a board of health, presided over by a physician, which reports now and then to the city council, and the report is sometimes published.

By law the contractors must clean the streets from 6 to 10 A. M. in summer and from 7 to 12 o'clock in winter. In summer the streets must be cleaned three times a day.

FROM THE MAYORS' VIEWPOINT

What Their Cities Need in Improvements to Paving, Lighting, Sewers, Water Supply, Paving Machinery, Etc.

School, Sewer and Water Supply for Sacramento

A new high school is greatly needed in Sacramento, Cal., said Mayor Hassett in his message. A new sewer system is also greatly desired and is necessary to the health of the city. A city hall should be erected to take the place of the present quarters in which the city officers are located. A good water supply should be speedily installed and the ownership should be vested in the city.

Uniform Accounting in Houston

THE message of Mayor O. T. Holt, of Houston, Tex., reviewed briefly the work of the different departments of the city government, showing what had been accomplished in each. Considerable increase in departmental appropriations were made necessary by the need for a more modern and efficient service. Notwithstanding the tax collections were but five-sevenths of those of the previous year, the public debt was decreased over \$136,000. A new system of accounting, recommended by Haskins & Sells, was put in operation in March, and the detailed workings of the system have progressed without friction. Previous to the introduction of this system, there was no general and uniform system of accounting in all the departments, which required unnecessary clerical help and involved extra expense, making the finances of the city a matter which could not be intelligently presented. At present, daily reports are rendered the Comptroller by the heads of each department collecting revenue. By the new charter that became operative in July, 1903, the positions of Comptroller and President and Vice-president of the Council were instituted, and an area of seven square miles was added to the city. As told in another column, the Council passed ordinances regulating the rates for public utilities, which, while not reducing the former rates to a very great extent, fixed the rates so that they could not be altered except by Council and made them clear to all citizens.

Cost of Lighting Greatly Reduced

In reviewing the past year in Memphis, Tenn., Mayor J. J. Williams calls attention to the fact that more streets were paved in 1903 than during the entire preceding history of the city. Low prices were secured for the asphalt paving and the pavements have proved substantial and satisfactory. Much more paving should be laid during the coming year; an asphalt drive should be constructed to the trotting park. Sewer extensions should be pushed and grade crossings should be abolished. The policy of lighting the business streets with electricity and the outer districts with vapor and gas lights has been most satisfactory. The price of electricity is now 11 cents per kilowatt, or one-half of what it was six years ago, while the cost of gas is 65 cents cheaper, or \$1.10 a 1,000 feet. The fire department has been almost doubled since 1897 and the police force is twice as large as it was six years since. The health of the city was never better than in 1903 and few cities have so low a death rate. The position

of city tax assessor was created by the last legislature and it is probable that much property, heretofore escaping taxation, will pay its just share.

More Schools Needed in Knoxville

The death of Mayor McTeer prevented any summary of the departmental work in Knoxville, Tenn., in 1903. Mayor W. H. Gass, in his inaugural address, stated that the good example set by the preceding administration should be followed. Especially should the method of taxing the gross receipts of the corporations, in return for the franchises granted, be continued. While the expenditures should never exceed the revenues, Mayor Gass urged that every means should be taken of obtaining all revenue possible and that liberal appropriations should be made for the school, fire and police departments especially, in his opinion the most important of the city government. Regarding the schools, he said, "It may be the man behind the gun that sinks the ship, but it is the boy in front of a spellingbook, in a comfortable and healthy school, that ultimately saves the city." More schools are greatly needed. All the laws should be enforced that those that are bad will be soon repealed as the best way to repeal a bad law is to enforce it rigidly.

City Should Own Water Works

Terre Haute, Ind., should own its own water-works, according to Mayor Henry C. Steed. He promised better garbage collection service and stated that the crematory had never been run so economically as during 1903. The growth of the city demands a new fire house in the eastern part.

Municipal Lighting for Newport, Ky.

Mayor August Helmbold, of Newport, Ky., advocated the municipal ownership of a lighting plant. He said that from data received from various cities, electric lighting of the city's streets can be done for less than half the cost paid now to a private company. He recommended that steps be taken at once to build a municipal plant and to complete it, if possible, by 1905. The road and bridge tax imposed on citizens should be equalized by a vehicle tax on country people. As many streets as possible should be rebuilt or constructed with brick or other material equally as good. He opposed the exemption from taxation of manufacturers as it is contrary to law not to tax them.

Street Sweeper and Road Roller Recommended

Mayor Thomas Brady, of Bayonne, N. J., recommended to Council that the fees, usually collected by the Commissioners of Assessments and the City Surveyor in the matter of street improvements, should be abolished and the said personages be paid proper salaries from the general funds. All other expenses attending such work should come out of the general finances, only the actual contract price for the work being assessed against the property benefited. The Mayor also recommended that more attention be paid to the appointment of inspectors of paving and only fit men should be employed. Contractors will then give more attention to doing good as

they will know that experienced men are to pass on the work. No contracts should be awarded unless the price is at least equal to the estimated cost, or unless the price of materials has risen since the estimate was made. As an inducement to having property owners improve their streets, the cost should be ascertained by the City Surveyor and the information circulated among the interested by means of a printed pamphlet. The City Surveyor should not confine bidders to any particular brand of material, as competition is thus prevented. Mayor Brady recommended that a street sweeper and a steam roller be purchased. The latter could be used in winter to pack down the snow on the streets. He called attention to the need of citizens keeping from throwing refuse and papers on the streets as the cost of cleaning is thus greatly enlarged. The trolley service comes in for a large amount of censure because of the inadequate service and lack of heat in the cars.

Economy Needed in Medford

Economy was the trend of the message of Mayor Charles S. Baxter, of Medford, Mass. He said that much attention was given during the year to the care of the streets. The old street signs are giving place to those of a new style which should be rapidly put up in all parts of the city. He recommended that more money should be spent on the care of trees, \$6,500 of which are in the hands of the Highway Department. Because of the increased charges of the Metropolitan Water Board for water supplied, it will probably be necessary for Medford to increase its water rates.

To Lay Brick on Wilkes-Barre's Streets

By practicing the strictest economy, no deficit will occur in the finances of Wilkes-Barre, according to Mayor Charles H. Price. Public improvements should be made from loans that extend over a number of years, as a greater number of people will then participate in the payment as they enjoy the improvements. The health and convenience of the people demand that permanent improvements be made in all departments of the city, and especially in those of street and sewer. A park should be provided for at once and the money to buy the land and lay it out could be obtained from selling the coal that underlies the river bed. The central station house is in a deplorable condition and should be replaced with a new and modern structure. Provision should be made for removing the cobble-stones from the principal streets and for repaving the same with vitrified brick as soon as expedient.

Should Spend Money on Permanent Improvements

While the question for a fully paid fire department in Binghamton, N. Y., has been discussed for a number of years, Mayor S. L. Smith is not in favor of its adoption for some time to come. The work of sweeping the brick streets during the past year has been done by the city and more and better work was done at less cost than if performed by contract. A portion of the funds appropriated each for improvement should be devoted to making permanent repairs, and then it would be only a few years before the conditions and general appearance of the streets would be greatly improved. A certain amount of macadam paving should be laid each year and, while this would be a little more expensive than the repairs, the results would be better in the long run. Another

year's experience with the filtration plant has proved that wisdom of installing it. The water department has been well managed and is a credit to the city. All the brick pavements are in good condition and wearing well and the asphalt paving is in better condition than is usual at this time of the year. An amount of sewer work should be done in different sections of the city. Precautions should be taken to minimize the danger from fire by a systematic inspection of buildings. All the schools should be equipped with fire escapes.

Modern Fire Alarm System Needed

The policy of Mayor Lansing's administration in the matter of street improvements was endorsed by Mayor Thomas B. Kimber, of Rensselaer, N. Y., in his message. Mayor Kimber advocated a new city hall and a modern fire alarm system as well as one for the police department. He pleaded for economy in city affairs although liberality should be shown in the direction of needed improvements.

Large Sewer System for Hoboken

Hoboken, N. J., has been greatly handicapped during the year by the action of the Board of Commissioners of Appeals by the reduction of \$1,000,000 in assessed valuation made by this body. In addition, said Mayor Adolph Lankering, the city's share of the State franchise tax was reduced by \$9,000 by the State Board of Assessors. He recommended that an expert engineer be appointed to pass on the plans for the sewer system proposed, which will greatly increase the health of the city. Property owners should not be permitted to throw rubbish on the streets as it is impossible to keep them clean under such circumstances.

A Well-Paved City Is a Well-Advertised One

A year of uninterrupted prosperity has been the lot of Savannah, Ga., according to Mayor Herman Myers. Speaking of paving, Mayor Myers said, "I emphatically believe that a well-paved city is a well advertised city, a city that reflects credit upon its citizens and draws people to it, and no form of public betterments meets the needs of the people more than improved highways, or is more satisfactory to taxpayers as a whole." Much additional paving must be done before Savannah can be called a "well-paved city. Vitrified brick continues the favorite material for street paving here, and it is, in my opinion, the cheapest and best for our needs. The cost of maintenance is practically nothing." A new city hall, to cost \$150,000, is to be erected in 1904 and provisions for paying the cost of the same have been made in part. Efforts to provide a surplus from last year, resulted in a balance of \$51,000 in the treasury, an appropriation of \$60,000 was made from the coming revenues; and the Mayor suggests that the balance be made up from ground rents by offering a discount of from 15 to 20 per cent. for six months, that people will be induced to pay up. In this way the building can be paid for this year. A law should be enacted requiring the street railways to equip the cars with fenders of approved style. The wanton waste of water requires that measures be taken to reduce the same and a number of meters have been placed on manufacture with good results. The meter system should be extended. A plan for a large system of storm sewers should be laid out and the work carried over a number of years. The tax rate should be reduced from \$1.45 to \$1.25 per \$100.

AMERICAN ROAD MAKERS' CONVENTION

THE largest and most important of good roads gatherings took place in Hartford, Conn., on the 10th and 11th of February. It was the convention of the American Road Makers. Arriving delegates were escorted to their hotels in automobiles by members of the reception committee. The capitol had been secured for the place of meeting and the legislative hall was soon filled with delegates as the time of the convention to open drew near. President Horatio S. Earle, of Detroit, opened the meeting, introducing Lieutenant-governor Roberts, who welcomed the delegates in the absence of Governor Chamberlain, of Connecticut. On behalf of the city of Hartford, Mayor Sullivan also welcomed the delegates, saying that from Hartford first emanated the slogan of good roads. President Earle's introductions were very witty and were enjoyed by the audience. He presented U. S. Senator Latimer, author of the Latimer Road Bill, who was able unexpectedly to attend. The Senator spoke in favor of the passage of a road law by Congress and denounced certain politicians in Washington, who did not wish such a bill passed because it was a presidential year.

The address of President Earle was on the subject of national aid and the right of the rural communities to receive such aid. He said. "The farm pays more than its share of tax to support the county poor, the county sheriff's force, the county court, the State supreme court, the militia, the State prisons, the insane asylums and the houses for feeble-minded and children's reformatories. Let the State practice reciprocity by aiding in improving the roads that all use."

The subject of rural highways was taken by Hon. Martin Dodge, Director of the Office of Public Road Inquiries at Washington. He said in part, "One of the chief cornerstones on which every great city is founded is cheap transportation, not only cheap transportation for long distances over both land and water by means of which the food products and the materials for manufacture can be concentrated with but little cost, but cheap transportation in the cities themselves by reason of paved streets and vehicles propelled by inanimate power. The country districts lack this important element, that is to say, cheap transportation, to a great extent. * * * The only way to cheapen transportation in the main to the country people is by means of public highways improved at public expense. * * * So we have now for the first time the northern farmers, the southern statesmen and the representatives of concentrated wealth in the great cities all favoring a new plan of co-operation in road building by which the people in the rural districts shall be relieved of a portion of the burden and the entire cost distributed so that all shall bear their just proportion."

At the second session, Mr. R. A. Meeker, State road supervisor of New Jersey, spoke of what had been accomplished in his State by means of State aid. There has been an increasing demand for assistance in road building and it has been necessary to increase the appropriation every year. He said, "State aid for road improvement has proved itself to be one of the grandest conceptions, and, in its enactment, one of the wisest, best and most beneficent acts that has ever been placed

upon the statute books by the lawmakers of any commonwealth. Good roads are for all."

Hon. W. E. McClintock, highway commissioner of Massachusetts, spoke on "Highways in Massachusetts," telling of the organization of the Commission and how it carries out its work. He also described the law under which good roads are built. "The Connecticut Plan" was explained by Highway Commissioner James H. Macdonald. He showed how simple this law is, when he said, "A town simply applies to the commissioner; the application is filed away, and on a certain day all applications are taken up; if there is not enough money to give to all the towns the sums for which they apply, a pro rata share of this money is given to each of these towns. The basis of this award is in accordance with the grand levy of the town. A town having \$1,000,000 and over on its grand list is entitled to two-thirds of the expenditure from the State to a maximum amount of \$4,500 in any one year. A town with a grand levy of less than \$1,000,000 is entitled to three-fourths of the amount of money which they may expend to the same maximum amount of \$4,500."

At the opening of the second day's session, the Directors reported that they had removed the former initiation fee to membership in the American Roads Makers and had reduced the annual dues from \$5 to \$2. Governor Batchelder, of New Hampshire, was the first speaker and he considered the advantages of a vigorous national and State policy regarding highways.

The Committee on Nominations, consisting of Hon. E. A. Bond, of New York; James W. Hunter, of Pennsylvania, and William Dunman, of New Jersey, reported the following nominations: For president, Hon. James H. Macdonald, of Hartford, Conn.; treasurer, William Pierson Judson, of Albany, N. Y.; secretary, Col. W. L. Dickinson, of Springfield, Mass. The nominations were unanimously confirmed.

It was reported that, by the middle of the second day, 1,126 delegates, representing twenty-nine States, had registered at headquarters. Mr. F. Z. Wilcox, of Syracuse, N. Y., vice-president of the National Good Roads Association, spoke on "What the National Good Roads Association Had Done to Improve Highways." Highway Engineer A. N. Johnson, of the Maryland Geological Survey, told of the good roads movement in his State, how it was started and the progress made to date. Mr. James W. Abbott, Pacific representative of the Office of Public Road Inquiries, told of the good roads movements across the continent. The State aid law of Pennsylvania, was described by Highway Commissioner James W. Hunter, of that State. No city or borough receives any aid for highway work under this law, which has been in operation about a year.

In the roll call for States, Commissioner Macdonald was called upon to make the closing address for Connecticut. He said he had not sounded his State on the subject of national aid, but knew that every town had applied for assistance from the State. He was sure that, when some intelligent plan is submitted to Congress for the wise distribution of national aid, no senator or congressman will oppose it. Thus far, however, no such plan has been presented.

League of Michigan Municipalities

THE most largely attended meeting of the League of Michigan Municipalities since its organization in 1899, was held at Ann Arbor, on February 11-12. Mayor Brown welcomed the delegates to Ann Arbor and Mayor John F. Bible, of Ionia, responded, speaking of the value of such meetings in the education of public sentiment and referring to the value of unity of purpose. He said the purpose of the League was "to inform the people, that they might get the best service for the least money." The report of Secretary John A. Fairlie covered the origin of the League and the work of the past year.

The first paper was by Alderman Elvin Swartout, of Grand Rapids, on "Some Requisites of a Good City Charter." Some of his remarks were humorous, especially when he said that the sheriff would allow only himself of all the Council, to leave the city at that time. He favored the single as against the double house method in city legislatures. He carefully considered the subjects of franchises and street improvements.

In the absence of Commissioner W. H. Maybury, of Detroit, his secretary read his paper on "Public Works in Detroit." He said careful inspection of material was the duty of all city officials, who should invite criticism and suggestions from the public. Hon. E. R. Nellis, Mayor of Wyandotte, discussed "Sanitary Sewers in Small Cities," and Dr. James W. Inches, of St. Clair, talked about the tar macadam pavements in Hamilton, Can.

The second session opened with a paper by C. A. Kent, president of the Michigan Political Science Association, on "Municipal Ownership of Public Utilities." He endeavored to treat both phases of the question impartially. Hon. F. F. Ingraham, of the Detroit Public Lighting Commission, discussed the question, favoring the municipal side. A talk on "The Water Supplies of Cities," was given by Dr. V. C. Vaughan, dean of the Medical Department of the U. of M. He declared the water supply of Ann Arbor to be excellent. After discussion, Senator C. G. Simons delivered an address on "Direct Primary Elections," which he strongly favored.

City Solicitor U. G. Denman, of Toledo, O., opened the third session with a paper on the "Ohio Municipal Code," defining the duties of the officials under it and telling of the good results. Alderman David E. Heineman, of Detroit, talked on "The Legislature and City Bills," and Delos F. Wilcox, secretary of the Grand Rapids Civic Club, spoke on "Municipal Home Rule: City Charters Framed by Municipal Conventions," asking that more power be given to cities to manage their own affairs. S. D. Callender, attorney for the Detroit Municipal League, discussed "Merit in Municipal Administration."

The first speaker at the last session was Judge C. B. Grant, of the Michigan Supreme Court, who spoke on "The Enforcement of the Criminal Laws of the State in Cities and Villages." Professor F. L. Sage, of the Law Department of the U. S. M., read a carefully prepared paper on "Some Legal Aspects of Special Assessments." While the few should not be taxed for the benefit of the many, the many should not be taxed for the benefit of the few. On this theory rests the justice of the special assessment. In the absence of C. C. Brown, of Indianapolis, Ind., his paper on

"Uniform Municipal Accounting," was read by a delegate. "The Work of the Wisconsin League of Municipalities" was explained by Professor S. E. Sparling, of Madison, Wis., the secretary.

The following officers were elected by the League: President, John F. Bible, Ionia; vice-president, Wm. F. Moeller, Detroit; secretary and treasurer, John A. Fairlie, Ann Arbor; trustees, Samuel Foly, Kalamazoo; Dr. Geo. C. Hufford, Albion; Dr. J. W. Inches, St. Clair; E. G. Swartout, Grand Rapids; W. D. Jones, Dowagiac. Ionia was selected as the next place of meeting. A banquet was held in the evening and the next day the delegates visited Detroit as the guests of the Council of that city.

Municipal Railways in Glasgow

GLASGOW, Scotland, is noted for its success with municipal ownership of public utilities and in the direction of street railways it has been especially successful, inasmuch as this utility is one of the most difficult for a city to manage and is usually the last to be undertaken. From the last report of the Tramway Committee, which has charge of running these railway lines, some idea of the operations of the lines may be obtained. There are sixteen lines under the supervision of this Committee. The tramways have always been the property of the city, but were leased to a company in 1871 for twenty-three years. The company paid the interest on the money borrowed for constructing the lines; paid 3 per cent. for a sinking fund; placed 4 per cent. per year with the city for renewals of the lines to be made by the company at the direction of the city; paid \$750 a mile for rental per year; paid all other expenses incurred by the city in connection with the lines. At the expiration of the lease, the city took over the lines, having already erected a number of stations and provided new equipment, and the whole system placed in good condition for municipal operation. The new cars were a great improvement over those run by the company, and the reduction of fares was the most direct benefit to the public. The success of the undertaking was assured from the start and has been in operation ten years this coming May. Electricity was introduced in 1898 and was rapidly extended. There are 148½ miles of track.

The revenue during the year amounted to \$3,282,861.97, and the expenses, including depreciation, \$2,159,350.77, leaving a gross balance of \$1,123,511.20. The previous year the revenue was \$3,072,066.22, the expenses for operation, including depreciation, \$2,025,515.14, leaving a gross balance of \$1,046,551.08. Thus, last year the gain over 1901-2 was \$76,960.12. From the gross balance of the past year, a net balance of \$501,384.50 remained after interest and sinking fund charges and the annual payment to the common good had been met. An extra payment of \$50,000 was made to the common good from the net balance given above. Because of the high rates charged for electrical material, the sum of \$200,000 was written off the cost of feeder cables and overhead equipment and \$125,000 has also been written off the cost of buildings originally constructed for horse traction. The balance of \$126,384.50 was added to the General Reserve Fund. From the details of the account as given, it

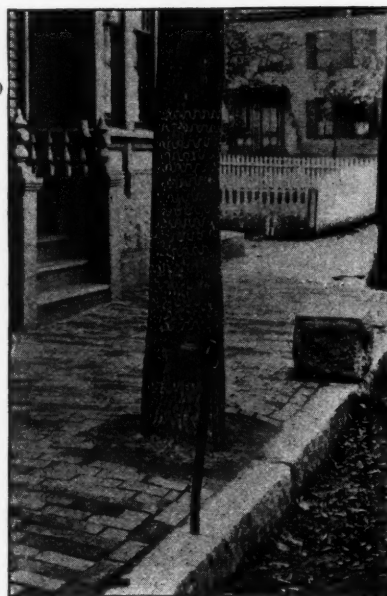
appears that the revenue, although more than the previous year, was actually less, being 0.94 of a cent less per car-mile; but the working expenses showed a decrease of 0.62 of a cent per car-mile. As the lines are extended and the service increased, the revenue per car-mile may be still further reduced, but the working expenses have almost reached a minimum. According to the acts passed authorizing the city to borrow money for its tramways, the net balance of the amounts to be borrowed was \$10,215,986.64, and the unexhausted balance to be borrowed when needed, at time of the report, was \$769,429.64. The total amount of sinking fund was \$560,191.85, the sum of \$776,662 having been used from the sinking fund to pay off the debt. The net amount expended on Capital Account up to the time of the report was \$10,647,560; the amount to the credit of the permanent renewal fund from which renewal of track can be made, was \$683,947.39; the general reserve fund had a balance of \$105,672.66. The maintenance of the roadways between the tracks and for eighteen inches on either side cost \$105,106.10, and, in addition, the sum of \$267,583.31 was charged against revenue, being the estimated annual expenditure necessary for the renewal of the track, calculated at the rate of \$2,250 per mile of single track. As stated above, \$125,000 was applied from the net surplus for depreciation of buildings in addition to the amount of \$73,762.57, which was charged for repairs and depreciation for the year. The repairs in the power plant amounted to \$21,249.10 and, in addition, \$102,776.18 was charged against revenue to meet depreciation.

There were 611 electric cars in operation and seventy new cars have been in the course of construction. A drop fender has been placed on each car and 100 have been fitted with the Westinghouse electromagnetic track brake for a year's trial. The cost of inspection and repair of cars amounted to \$137,647.77, and a further sum of \$125,432.77 was charged against revenue for depreciation.

The department has experimented with many devices during the year to see that the lines had the most up-to-date equipment and improvements. Season tickets and transfers were considered but were decided against by the General Manager. He also found it necessary to use great care in selecting employees, all the men undergoing strict examination as to eye-sight, hearing and general physical condition. For the first six months the men act as conductors and then go through the training school for motormen. At the depots ambulance classes were held during the year and competition between the various depots was encouraged.

The valuation of the undertaking was largely increased and taxes in the amount of \$210,000 were paid. During the year the 2-cent fare was extended to cover four consecutive 1-cent stages. The fares range from 1 cent to 8 cents by 1-cent stages, 32.05 per cent. of the number of passengers paying 1 cent fares and 60.97 per cent. paying 2-cent fares. The average of receipts per car-mile was 22.38 cents and the number of passengers was 177,179,549. The average working expenses per car-mile was 14.8 cents. The average fare charged per mile was 0.9 of a cent and the average fare per passenger was 1.76 cents. The scale of fares shows that, for 1 cent, 0.58 of a mile may be journeyed; for 2 cents, 2.3 miles; for 3 cents, 3.48; for 4 cents, 4.64; for 5 cents, 5.8; for 6 cents, 6.89; for 7 cents, 8.15; and for 8 cents, 9.09 miles.

To Protect Street Trees from Horses



HOOPER'S EXPANSIVE TREE GUARD IN POSITION

Walter Crane, who has done so much to beautify London, says that the great want in modern cities is trees, which should be planted wherever possible along the streets. In American cities this want still exists, although efforts are being made to preserve those trees that still survive. Several cities have installed forestry departments which take entire charge of street trees, giving them greater and more intelligent care than could be done by private owners, 99 per cent. of whom

know little or nothing about the needs of trees, or fail to appreciate the great work that trees play in preserving the health of a city as well as adding to the beauty of the streets. All cities should place the street trees in charge of a special department, which should have the facilities and funds necessary to care for its charges in the best possible manner. Springfield, Mass., and Yonkers, N. Y., will serve as examples of what should be done along these lines.



Courtesy, Dr. E. H. Jenkins, New Haven, Conn.

TREE WITHOUT GUARD—BADLY INJURED BY HORSES.

The two great enemies of trees are insects and horses. To guard against the former, great watchfulness and intelligent care in destroying the pests at the first sign of their appearance are necessary. This can be done only by experienced foresters. The second enemy, the horse, must be treated in a different way. Thousands of trees have been destroyed be-

cause no attempt has been made on the part of city authorities to compel the use of efficient tree guards. Horses are tied to trees, or to posts nearby, where they are permitted to nibble at the tree's bark, and it but a short time when the tree fails to put out its leaves in the spring and wonder is expressed over the cause for death. It is the duty of all cities to either provide proper tree guards for all the street trees wherever exposed to horses, or compel property owners to place such guards on their trees.

The proper guard should be as little noticed as possible, while, at the same time, be of such a character that, placed on the tree when it is young, it will expand as the tree grows. With such a guard, the tree is at all times properly protected and, with reasonable care, the first cost is the only one. The accompanying illustration shows a guard made by D. W. Hooper, Biddeford, Me., that meets these requirements. After having been on the tree over nine years, the wire became stained the color of the bark and was hardly noticeable. In fact, in order to take the photograph shown, it was necessary to chalk the wire to make it show in the illustration. Being made in the form of loops, the guard expands as the tree grows and thus but one guard is necessary during the life of the ordinary street tree. A simpler and neater guard could not be secured.

Brick and Asphalt Plants in Detroit

The purchase of an asphalt repair plant for Detroit, Mich., was announced in the message of Mayor W. C. Maybury and it will soon be in operation, thus solving a long-discussed problem and leading to a great and wise economy in the matter of asphalt laying. Mayor Maybury was also desirous of installing a brick plant, which would prevent excessive prices for that paving material. Whenever the price of brick was but a little above the cost of making it by the city, the plant should not be operated, but could be held to begin operations whenever prices were raised. In city affairs, uniformity of method always conduces to satisfactory results and so the Mayor recommended that means be taken to secure some plan of accounting to be used in all departments. That employed in the Comptroller's office might well be adopted, as it is the natural center where financial matters gravitate for final adjustment. A new charter is badly needed and the Mayor recommended that the Legislature be asked to pass an act creating a commission. The Mayor again recommended that a public bath be erected adjoining the municipal lighting plant, that the exhaust steam could be utilized to good advantage. The need for such a bath is self-evident and the health of the community demands it. A free employment bureau should also be established, that employers and men out of work could be brought together. The question of safety in theaters was touched upon, the Mayor recommending that the diagram of theater exits be printed on every program and that men be detailed under order of the Fire Commissioners to attend every performance. The fact that the franchises of the street railway companies were about to expire, made it necessary that the Council consider the question seriously with a view to correcting in future franchises, the evils that exist and which are the cause of complaint on the part of citizens.

Rates for Public Utilities in Houston

How other cities regulate rates for public utilities is always of interest to officials of a city because the time may come at which it will be necessary for them to make their own regulations and what another city has done along the same lines will guide them. The city of Houston, Tex., recently made some regulations governing its public utilities, a summary of which is given:—

In the matter of street railways, the fare for adults is fixed at 5 cents; children between five and twelve years may use tickets which are sold at twenty-five cents for ten, the tickets to be transferable and good when detached from the book.

The kilo-watt-hour is made the basis of charges for electric lighting and power, a single and a double rate being in force. The former applies to commercial lighting and is 12 cents per kilo-watt-hour with a monthly minimum of \$1. In addition there is a liberal discount for bills paid on or before the tenth of the month, ranging from 5 to 30 per cent. according to the amount of the bill, the former applying to amounts under \$5 and the latter to \$100 and over. The double rate calls for 12 cents per kilo-watt-hour for the first two hours consumed per month per sixteen candle-power incandescent lamp, or its equivalent, and 7 cents per hour in excess of that amount. The residence rate is 13 cents per kilo-watt-hour for the first two-thirds of a kilo-hour per month per sixteen candle-power lamp, and 7 cents for energy in excess of that amount. The minimum rate is \$1 and 5 per cent. discount is allowed on bills paid before the tenth of the month. The rate for power per monthly consumption of 1,000 kilo-watt-hours, or less, is 6 cents; over 1,000, 5 cents, with the same discounts as above. The day rate for fans with direct current ranges from \$4 to \$12 per month, graduating from one fan to thirty; the night rate is from \$5 to \$55. Half of the rate for fans applies from November 1 to March 31. A penalty of from \$25 to \$100 is placed on companies that overcharge.

The gas rate is \$1.50 per 1,000 cubic feet. The consumers are not to pay for the use of meters, except when no gas is being used, when a fee of 10 cents a month may be charged. Eighteen-candle-power gas must be furnished. The consumer can be taxed 10 per cent. of his bill if he does not pay within ten days after the first of the month.

Telephone companies having 3,000 or less subscribers may charge offices and business houses \$3 per month and residences \$2. For party line service the rates are to be \$2 for offices, and residences \$1. Companies having more than 3,000 subscribers may charge offices \$5 per month and residences \$2; for party lines, \$3 is to be charged offices, and \$1.50 residences.

All carriages, hacks, omnibuses and motor vehicles for public service must carry children under five years free, and from five to twelve years, at half rates. The day rates are: One passenger, one mile or less, 50 cents; each additional passenger, 35 cents; each additional party to the same destination, 15 cents each. The night rates are: One passenger, one mile or less, 75 cents; and each additional passenger, 50 cents; each additional half-mile or less, one passenger, 35 cents; each additional passenger in same party, 25 cents. Carriage or hack service by the hour is fixed as follows: For the first hour, one or more passengers, \$1.50 between the

hours of 5 A. M. and 12 midnight; from 12 midnight to 5 A. M., \$2 per hour. For each additional quarter hour, the rate, day or night, is 25 cents. When a hack or carriage must travel one mile or more to reach the passenger, 25 cents may be asked, but in all cases, the most direct routes must be followed. The Chief of Police must inspect the public carriages and require that they be kept in a cleanly condition. The rate cards, license number, etc., must be kept in or on the vehicle for the inspection of passengers. A passenger refusing to pay the legal rate is subject to a fine of from \$5 to \$10, provided the legal fare has been demanded in advance. A similar fine is to be imposed on drivers who demand more than the legal fare.

The rates to be charged by drays and baggage wagons are also regulated and the size and weight of matter that shall constitute a load, such as, so many bales of cotton, so many barrels of rice, sugar, etc. The rate for drays and trucks is 25 cents per mile, or less, per load, and 15 cents for a haul of half a mile. The rate for baggage wagons for carrying a trunk a mile or less, is 25 cents; for a mile and a half, 40 cents; and for two miles, 50 cents. The driver must load and unload his wagon. Furniture, pianos, and similar freight are not subject to these rates.

According to City Secretary D. D. Bryan, the rates for water have not yet been adjusted, although the special committee of the Council that fixed all the other rates, drew up an ordinance covering charges for water as well as for the other utilities mentioned. When the rates are fixed after the litigation with the water company is settled, they will be published.

Should Have Municipal Conduit System

CREDIT is given the Municipal League of Harrisburg, Pa., in the message of Mayor V. C. McCormick, for bringing about the paving ordinance which provided for free competition for all kinds of paving materials, thus reducing the prices. The ordinance taxing the gross receipts of one of the traction companies 3 per cent. has worked well, but Mayor McCormick recommended that it be amended so that the regular use of all tracks be ensured on penalty of their removal. He also stated the other traction company should be taxed an amount proportionate to that paid by this company.

The Mayor recommended that the Park Board organize a forestry department to have charge of all the street trees. The addition of 6,000 feet of hose was urged, that the Fire Department might not be handicapped in its work. A paid fire department is strongly urged, the extra expense not being large enough to over-balance the benefits to be derived from the paid force as compared with that now in service. The suggestion of the City Electrician that telephones be purchased for the police booths, was recommended by the Mayor.

The city should secure its own conduits and rent space therein to the various companies. The rents received would be amply to pay the interest and sinking fund charges and the constant digging up of the streets would be eliminated. The system could be extended a number of feet each year as the needs required and soon all the unsightly poles and wires would be underground.

Statistics of Arc Lighting in United States Cities and Towns

	Population, 1900.	No. lamps.		Watts at lamp terminals.		Schedule.	Hours burn per year.	Cost coal per ton.	Contract price per lamp per year.
		Open.	Closed.	Open.	Closed.				
WASHINGTON									
Chehalis	1,775	32	1	480	...	(2)(3)	1,220	(7)	z
Colfax	2,121	16	...	480	...	(1)(2)	3,250	\$5.50	\$121.80
Dayton	2,216	...	4	...	430	(1)	4,000	5.00	150.00
Everitt	7,838	...	70	...	...	(1)	4,000	1.50	{ 50.90 20.96
Hoquiam	2,608	20	...	480	...	(1)	4,000	Wood	75.00
La Connor	564	18	...	480	...	(1)	4,000	Wood	100.00
North Yakima	3,154	...	46	...	...	(1)	4,000	3.60	120.00
Olympia	3,863	15	...	480	...	(1)	4,000	W. P.	114.00
Port Townsend	3,433	...	16	...	550	(1)	4,000	Wood	156.00
Seattle	80,671	...	127	...	430	(1)	4,000	2.00	84.00
Spokane	36,848	225	...	480	...	(1)	4,000	W. P.	48.00
Tekoa	717	...	10	...	430	(3)	2,555	Wood	100.00
Walla Walla ..	10,049	...	78	...	...	(1)	3,950	W. P.	{ 75.92 3.60
WEST VIRGINIA									
Bluefield	4,644	30	...	480	...	(1)	4,000	2.00	68.40
Charleston	11,099	10	60	340	...	(1)	4,000	1.40	72.00
Clarksburg	4,050	52	20	340	430	(2)	2,600	Gas	43.50
Davis	2,391	22	...	480	...	(1)	4,000	1.50	70.00
Elkins	2,016	...	40	...	430	(1)	4,000	1.50	60.00
Fairmont	5,655	57	...	480	...	(1)	4,000	Gas	80.00
Grafton	5,650	95	...	480	...	(1)	4,000	Gas	z
Harpers Ferry ..	896	32	...	340	...	(1)	4,380	W. P.	36.00
Hinton	3,763	24	...	340	...	(1)	4,000	2.15	75.00
Huntington	11,923	...	100	...	...	(1)	4,000	.60	90.00
Keyser	2,536	28	...	480	...	(1)	4,000	1.70	75.00
Parkersburg	11,703	...	145	...	...	(1)	4,000	1.60	75.00
Point Pleasant ..	1,934	...	36	...	430	(1)	4,000	1.50	50.00
Sistersville	2,979	11	7	480	...	(1)	4,000	Gas	80.00
Wellsburg	2,588	...	36	...	430	(1)	3,600	Gas	58.40
Wheeling	38,878	503	...	480	...	(1)	4,000	1.18½	z
WISCONSIN									
Appleton	15,085	143	...	480	...	(1)	4,000	3.25	65.00
Ashland	13,074	36	...	340	...	{ (1) (3)	{ 4,000 1,825	Wood	{ 108.00 75.00
Beaver Dam ...	5,128	...	66	...	430	(1)(2)	2,179	3.65	{ 60.70 6.60
Berlin	4,489	46	...	480	...	(2)	1,600	2.20	{ 35.84 11.60
Brodhead	1,584	...	5	...	550	(3)	2,200	W. P.	60.00
Chippewa Falls ..	8,094	78	...	480	...	(1)	4,000	W. P.	85.00
Delavan	2,244	27	...	480	...	(2)	2,250	3.45	75.00
De Pere	4,038	8	35	...	385	(1)(2)	2,250	W. P.	{ 30.50 13.48
Eau Claire	17,517	90	...	480	...	(1)	4,000	3.90	74.00
Egerton	2,192	18	...	340	...	(4)	...	W. P.	84.00
Fon du Lac	15,110	70	...	480	...	(1)(2)	2,179	3.50	84.00
Green Bay	18,684	118	...	...	...	(1)(2)	2,179	(5)	75.00
Janesville	13,185	195	...	340	...	(1)	4,000	W. P.	62.00
Kenosha	11,606	117	...	480	...	(2)	2,500	2.35	78.00
La Crosse	28,895	217	...	480	...	{ 194(2) 23(1)	{ 2,600 4,000	{ 3.50 3.65	{ 70.00 100.00
Lake Geneva ..	2,585	24	...	340	...	(1)(2)	1,220	3.65	75.00
Madison	19,164	117	28	340	...	{ 117(3) 28(1)	{ 1,825 4,000	{ 3.75 3.75	{ 60.00 80.00
Manitowoc	11,786	...	20	...	550	(1)	4,400	3.00	80.00
Mauston	1,718	12	...	340	...	(2)(4)	1,550	W. P.	65.00
Marinette	16,195	70	15	340	430	(2)(3)	1,220	2.75	66.00
Marshfield	5,240	47	...	480	...	(2)	2,250	4.85	90.00
Menominee	5,655	38	...	480	...	(1)	4,000	(5)	100.00
Merrill	8,537	54	12	340	550	(1)	4,000	W. P.	55.00
Mondovi	1,208	...	11	...	550	(2)	1,135	Wood	60.00
Monroe	3,927	63	...	340	...	(2)(3)	1,385	3.12	65.00
Necedah	1,209	...	9	...	550	(2)(3)	1,800	Wood	55.00
Neillsville	2,104	13	...	480	...	(3)	1,825	3.40	66.54
New London	2,742	31	...	480	...	(2)(3)	1,220	...	72.00
Oconomowoc ..	2,880	40	...	480	...	(2)(4)	1,800	2.35	96.00
Oshkosh	28,284	275	300	340	...	(2)	{ 2,700 2,550	{ 4.15 4.15	{ 68.00 48.90
Phillips	1,820	18	...	340	...	(2)(3)	1,800	Wood	...
Platteville	3,340	...	10	...	430	(2)(3)	1,220	3.35	55.00
Plymouth	2,257	44	...	340	...	(2)	2,179	3.00	66.00
Rhineland	4,998	47	...	340	...	(2)	2,250	Wood	84.00
Richland Center	2,321	43	...	480	...	(2)	2,482	3.35	55.00
Ripon	3,818	4	...	480	...	(3)	2,190	3.00	84.00
Sheboygan	22,962	129	...	480	...	(1)	4,000	3.50	95.00
Spring Green ..	621	...	3	...	430	(2)	2,179	Wood	70.00
Stevens Point ..	9,524	78	...	480	...	(2)	2,179	3.75	78.00
Sturgeon Bay ..	3,372	34	1	480	...	(1)	3,650	3.50	100.00
Tomahawk	2,291	...	20	...	...	(2)	2,179	W. P.	55.00
Viroqua	1,950	...	4	...	430	(3)	2,065	4.00	90.00
Watertown	8,437	69	4	340	430	(1)(3)	1,825	2.75	60.00
Waupaca	2,912	29	...	480	...	(1)	4,000	(5)	75.00
Whitewater ...	3,405	...	50	...	...	(2)	2,179	2.50	80.00
WYOMING									
Buffalo	710	5	5	...	...	(1)	4,000	W. P.	144.00
Cheyenne	14,087	45	...	480	...	(1)	3,700	1.75	133.80
Evanston	2,110	...	39	...	550	(2)	2,190	2.35	180.00
Lander	737	...	6	...	550	(1)	4,200	4.00	180.00
Laramie	8,207	17	...	480	...	(1)	4,000	.75	168.00
Sheridan	1,559	10	...	340	...	(1)	3,650	1.50	156.00

(1) All night. (2) Moonlight. (3) Midnight. (4) Up to 1 or 2 A. M. The difference in time may be judged from the column showing hours lamps burn.

(5) Water power and steam. (7) Sawdust. z Municipal plant.

(THE END.)

NEWS AND PRACTICE AMONG THE CITIES

Municipal Grocery Store—Water Waste in Waterbury Must Be Stopped—Harrisburg's Water to Be Filtered—Success of Duluth's Municipal Plants

Municipal Grocery Store

THE first semi-annual report of the manager of the municipal grocery store at Kenosha, Wis., shows that \$2,000 was made in trade for the city. The store is run for the support of dependents. During the last six months, ten families with a total of forty-three persons, have received all their food and supplies from this store, for which the city was charged \$448. Before the opening of the store, the expenditures for this same purpose were \$2,412. Alderman Peter Jacobs has the store under his direction.

Will Increase the Meter Rates

THE loss of one contract for water and the probable loss of another during the coming summer, made it necessary for the Water Department of Newark, N. J., to increase its revenues. This has been done by increasing the charges for water service to \$1 a quarter. The Board of Works, which brought the matter about, estimated that this would net the Department about \$60,000 a year. With a little help, this increase will be about sufficient to pay all expenses. This charge of \$4 a year will cover the cost of examining, reading and maintaining the meters. Many small consumers do not pay more than \$2 a year for water, but the expenses attached to their meters are equal to those attending the care of large consumers. The cost not met by the water bills, has come out of the Department's surplus. The present minimum flat rate is \$6.25 a year, and it was argued that the minimum rate by meter should be at least as much as the minimum flat rate.

Street Work in Houston

ONE topic that has interested the citizens of Houston, Tex., during the past year, has been the work of caring for the streets. Therefore, the report of City Engineer Dormant proved of great interest. He reported a number of streets finished or in course of construction. In certain places grade-crossings have been eliminated, in one case the tunnel consists of steel beams laid on concrete abutments and is drained by means of an automatic electric pump working in a well. When the water reaches a certain height, the pump will start to work.

The operation of the new building ordinance has proved very satisfactory. The plans of all proposed buildings are now inspected and a code of regulations govern all construction. The office of building inspector has been created and makes it possible to inspect all buildings under construction.

City Engineer Dormant again recommended that a road-roller be obtained. A roller of about ten tons would enable the city to do its own repairs and, when not in use, could be rented out. The city is contemplating a large number of streets to be paved with gravel. When completed, this paving will give the city about thirty-two miles of additional pavements, or a total of fifty-nine miles.

Bay City to Do Commercial Lighting

ON April 4 the voters of Bay City, Mich., will have a chance to decide whether the city shall issue \$50,000 bonds to defray the cost of additions to the municipal lighting plant to enable it to undertake commercial lighting. It was decided unanimously by the Council to pass the ordinance that will bring this about. The prices for which lighting and power will be furnished will be adopted by the Council and the citizens look forward to better service at cheaper rates than they have been paying the private electrical companies.

Price of Arc Lights in Bogota

A RECENT report of the U. S. Consul-General at Bogota, Colombia, states that the price of electric lights in that city has been raised from 30 to 50 cents a light per month, and that, after the first of 1904, this price would probably be again elevated to \$1 of \$1.50. The rate for installing lights has also been raised from \$5 to \$7 gold. The reason ascribed for this increase, is the cost of transmitting power to the city from a water fall, twenty miles away, the power of the plant there being insufficient to supply the demand.

Water Waste Must Be Stopped

Two points are brought out in the report of City Engineer Cairn's to the Board of Public Works of Waterbury, Conn., viz.: the efforts made to preserve the purity of the water supply, and the great waste of water with consequent increased cost of pumping, etc. Regarding the former, the City Engineer says that little contamination has occurred because of the watchfulness of the inspectors. He suggests that a reward of \$5 be offered to anyone reporting a case, which on inspection proves to be of a nature to infect the water supply. All he asks is to learn of cases in time and his inspectors will immediately repair to the section and disinfect the premises.

In respect to the waste of water, the case is a serious one. In six weeks' time the consumption increased nearly 200,000 gallons a day, on December 8 last, being 7,076,250 gallons per day. Not more than two-thirds of this amount should be used. Unless the waste is stopped, new pipes and pumping facilities will be necessary. This excessive draft on the mains has made it impossible to secure steady water supply in several part of the city. Consequently he recommended that an inspection of every unmetered building be made and, where waste is found and not corrected on notice, meters should be installed. In two months the consumption would drop to 5,000,000 gallons a day if such measures were taken. Mr. Cairns has stated. He also asked the consideration of a universal meter system, for which \$50,000 bonds can be issued. A high service system has been considered, but no plans have yet been made. About \$10,000 must be spent for cast iron pipe for extending the distribution system.

Cheaper to Let City Do Work

It is reported by City Engineer W. H. Sieverling, that a number of citizens of Springfield, O., purposely failed to comply with the orders of the Council to construct cement walks, etc., that they might take advantage of the low prices made by the city's contractor as the city did their work and charged the costs to them. The city contractor laid 42,530 feet of cement walk and 6,813 feet of cement curb and gutter on property of these delinquents. The engineer was ordered to prepare a plan for separate sewerage and a disposal plant, carrying out the recommendations of the State Board of Health. The new code added considerable of a burden to the Department, inasmuch as, heretofore, the engineering work required for the Water Department has been done by outside help. A new supply of water was secured from a gravel area and the complete story of the work will be found in the December (1903) issue of the MUNICIPAL JOURNAL AND ENGINEER. Some interesting figures are given in the Engineer's report. The area of the city is nine square miles, there are 217.66 acres of parks, and the total length of sewers is 12.376 miles. There are 6.99 miles of brick streets, 0.505 miles of asphalt, 0.565 miles of Medina block, 14.259 of macadam, 45.836 of gravel, and 0.018 miles of cedar block. The total length of streets is 121.19 miles. Hand sweeping is done by the city on 193,046 square yards of streets, and by contract on 17,333 square yards.

Can Assess Guaranty Cost on Property

IN answer to a resolution of the Council of Chester, Pa., asking a legal opinion on whether the city could assess the whole cost of paving on property owners, including the guaranty of ten years, or only the contract price for the actual construction, City Solicitor A. A. Cochrane stated that the law on this subject was not clear, cases having been decided both ways, although the decisions supporting the price which included the guaranty were supported by better argument. He said, "I think that at the present, in this State, the weight of the decisions is in favor of assessing the guaranty cost. The reasoning to this end is, that having a pavement guaranteed is as much a part of obtaining good work and protecting the property owners and the city, as is selecting the kind of pavement, the depth of sand, of concrete, or of the work in any other public improvement. As they are discretionary with councils and there can be no question raised by the property owner as to whether the concrete shall be six inches or five inches thick, or whether the pavement shall be asphalt, brick or any other material (provided the property owners have not petitioned), it is just as discretionary whether the work shall be guaranteed or not. The property owner gets the benefit of the guarantee, in that the pavement at the end of ten years under the guarantee, must be left in as good condition as it was ten years previously, when the work was first done, and as nine years are allowed for payment, when payment is finally made, there is a good pavement."

In Chester the full price has usually been charged, a few exceptions only having occurred. Regarding the right of the city to charge for resetting curb when such has not been reset or set, he considers it illegal. A property owner always has a defense against a lien for work that has not been done,

Water and Light Plants of Duluth

THE accumulated savings of the Water and Light Department of Duluth, Minn., amount to over \$90,000 and are invested in construction. The growth of the water and light system has made necessary the use of appropriations in extending mains and the Board of Commissioners asked that an additional issue of bonds in the sum of \$50,000 be voted by the people to enable further extensions to be made. The larger the number of consumers, the less will be the cost to each, and the rates, at present, are low. A new pumping engine should be installed as soon as possible, as the present engines have been running to their full capacity and there is no provision in case of a breakdown. The report of the Manager, Mr. L. N. Case, showed that the earnings for the year were \$243,706.28. The expenses for operation and maintenance were \$91,706.10 and the interest, \$119,498.77, giving a total of \$211,204.87. Thus a surplus of \$32,501.42 is left. The receipts of the water plant were \$169,788.27 and the net earnings, \$27,917.21. The net earnings of the gas plant were only \$4,584.01. The West Duluth plant was purchased at \$140,000 and earned \$19,677.37, and a surplus of \$12,939.52 was left, but, as the old company would have had to pay about \$5,000 for water, this amount should be deducted from the surplus, making it \$7,939.52. It is estimated that, if the rates remain as at present, the plant will pay for itself in fourteen years, including all interest and maintenance charges.

Water Filtration for Harrisburg

By 1905 it is hoped to have filtered water for the citizens of Harrisburg, Pa., if the predictions of the Water Department as expressed in its annual report come true. A new scale of charges is not contemplated for the purpose of meeting extra expenses, including charges for the filter loan of \$310,000 and \$10,000 for street mains. The total receipts for the year aggregated \$123,253.66, which was less by \$1,384.89 than for 1902. Fully 55 per cent. of the water pumped is used for other than domestic service, and about 85 per cent. of this manufacturing service is metered. Free water was furnished for five hydrants, city offices, fire house, drinking fountains, highway and sanitary purposes amounting to \$23,341.00, and that furnished to the court house and prison in return for office rent was \$2,188.40, making the total amount furnished the city of \$25,529.40. That used by the hospitals and other charitable and public institutions was \$817.00, and \$891.40 was furnished churches, making a total of \$27,237.80 worth of water furnished free.

The report of the Department recommends the repeal of the practice of allowing credits to property owners for laying water mains in front of their houses. The cost of maintenance amounted to \$32,414.71, and the extraordinary expenses were \$14,477.77. Other expenses brought the cost up to \$49,582.74. A balance of \$73,670.92 was transferred to the interest, sinking fund and general funds. The total registered pumpage amounted to 3,436,294,900 gallons. The average cost of coal used to pump a million gallons for the last five years was \$3.58. The installation of the new pumping engine will be accompanied with a reduction of this cost. Of the 12,603 services supplied with water, 7,968 are receive water through meters, a system that is rapidly growing.

THE BOMBAY FIRE DEPARTMENT*

London Methods Introduced in Reorganizing Indian Brigade—More Modern Apparatus Still Needed—Chemical Engines Required—Compares Favorably in Fire Loss with European Cities

THE Bombay Fire Brigade, as we now know it, had its genesis in the Apollo street disaster of 1889. Prior to that event the provision for the protection of the city from fire was entrusted to the police—a force designed for an absolutely different purpose; the men were untrained in the craft of the fireman, the appliances, such as existed, were for the greater part obsolete, the hose pipes were deficient in quantity and defective in quality, the water supply was intermittent and uncertain; and most disastrous of all, the force was controlled by the Police Commissioner, whose training, of necessity, had turned his abilities in a different direction to that of the practical and specialized one of fire extinction. The Apollo street conflagration gave a woeful illustration of the inefficiency of the fire preventive resources of the city. On November 11, 1889, a small fire broke out in a hardware shop in Apollo street, the fire engines, such as they were,

more than a thousand of whom were thus engaged. It must have been an interesting spectacle, worthy of permanent record, when these assiduous, if elementary firemen, were ranged in a line the next morning arrived upon the scene, and for the prolonged period of forty minutes the men inactively watched the progress of the flames. An attempt was, however, made to combat the flames by employing an army of *bhisties*,

to receive among them the reward of over 1,100 rupees (\$533.50). As a result of the absolute failure of the Fire Brigade, a valuable block of property was destroyed, officially estimated at sixteen lakhs of rupees (\$776,000).

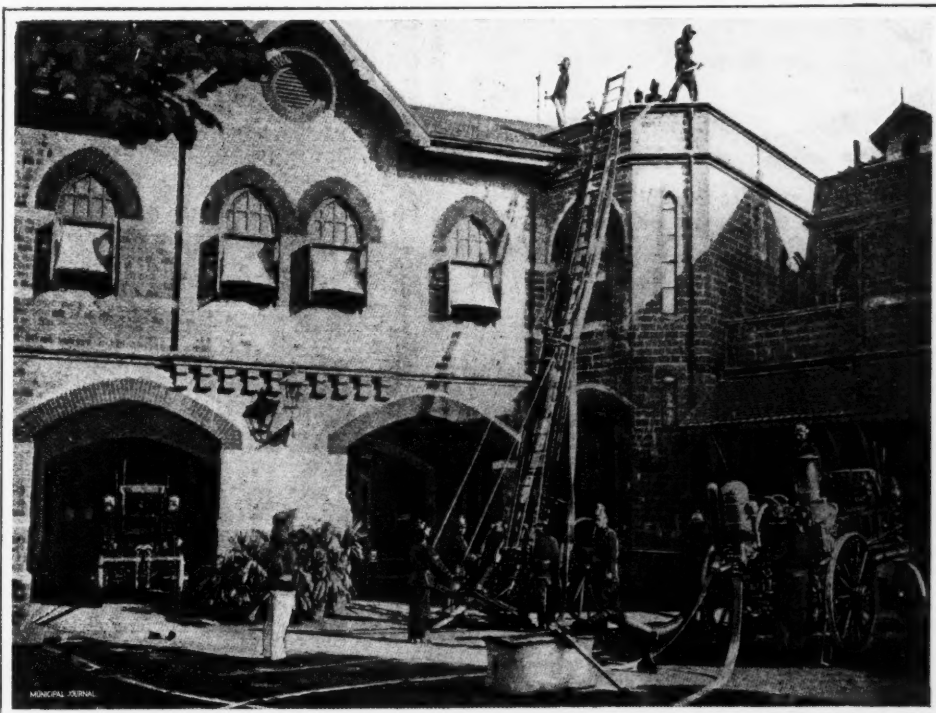
This monetary loss created a wholesome disgust with the method of coping with fire by means of *bhisties*. The burst of public indignation which these proceedings produced, led to the abolition of the old order of things, and a new brigade, based upon the latest London methods, was embodied.

The municipality for once did a wise thing. They confessed that they knew nothing about this subject and placed themselves in the hands of Captain Shaw, the then Chief of the London Fire Brigade. He it was who outlined the Bombay Fire Brigade in its regenerate form, and sent out in 1890 one of his most trusty lieutenants, Mr. W. Nicholls, who at that time had charge of the safety of Southwark, one of the most responsible stations in crowded South London, a position not one whit less important than the one he now so ably commands.

Mr. Nicholls entered upon his new duties, thoroughly determined both skill and courage; he had received the so-called "V. C." or the medal for bravery, of the London Fire Brigade, for saving the life of a woman by a gallant deed under conditions of exceptional peril to himself.

Mr. Nicholls entered upon his new duties, thoroughly determined

on business. He freed the Brigade from the worse than useless control of the police; he collected and drilled a staff of men upon the latest European methods; he condemned at once four of the steam fire engines, and secured in their place five of the most modern design from home. At that time, Bombay possessed only three fire-stations; viz, at Gowalia Tank, Clinchpokli and Pydhonee, to



BOMBAY FIREMEN DRILLING AT HEADQUARTERS

serve a city of three-quarters of a million inhabitants. Mr. Nicholl at once set to work and established the various stations exactly on the London model. Indeed, the fire-stations of Bombay, spotlessly clean as they are, with their crimson vehicles, their burnished brass, and rows of shining helmets, are the most homelike bit of London in the whole of the wide East. In place of three, there are now twelve fire-stations in Bombay. Six of these are steamer stations, each containing a steam fire engine, hose reel, coal tender, and long ladder, and manned by a staff of seventeen men. These are situated at Chinchpokli, Babula Tank, Fort, Colaba, Gowalia

* Digest of an article in *The Indian Municipal Journal*.

Tank, and the head depot is at Byculla. In the latter station, besides the three steamers, there is also stored the rescue van for service at fallen buildings. This contains a complete equipment of tools and accessories of every description for this class of work, ropes, lanterns, buckets, saws, and stretchers for the dead and wounded. The other six stations have only hand-engines. Each station is fitted with the telephone, the Market being the center from which all alarms of fire radiate.

On the occasion of the fatal accident at Sitaram Building, the rescue brigade rendered splendid service, working continuously for twelve hours. This incident showed a deficiency in the equipment—there were no hydraulic jacks to raise beams. Mr. Nicholls hopes some day to receive these. Pending their arrival, he made two massive iron-shod levers about twelve feet long and of heavy section to be used for the purpose.

EQUIPMENT OF THE DEPARTMENT

At the Byculla headquarters a staff of men are engaged in harness making and repairing, in painting vehicles, in cleaning and drying hose, and in overhauling the boiler pumps and the working gear of the fire engine itself. The men are also employed in testing the hydrants, each one of which receives a close examination once a month. The accompanying illustration shows the men at the Byculla headquarters going through their ordinary fire drill under the direction of Mr. Nicholls. The hose and fittings in both the municipal buildings and the Crawford market receive continual attention.

The present strength of the brigade under the Chief Officer, Mr. Nicholls, is made up of seven engineers, one head foreman with five assistant foremen, eighteen tindals, 108 firemen, eight drivers, eight grooms, and two clerks; a total of 158 in all. The men are selected carefully for their honesty, sobriety, and physical fitness. An aptitude for "toddy tree climbing" is a special recommendation for fire brigade work. The wages paid range from 10 to 35 rupees per month (a rupee is equivalent to 48½ cents in American money), for brigade men according to their ability and service; whilst the native engineers earn from 60 rupees upwards. All the native brigade men received the warm commendation of their chief for their hard work, courage and endurance, oftentimes in the face of great difficulties and imminent risk.

The equipment of the brigade consists of eight steam fire-engines, eight hand-engines, sixteen hose-reels, seven tender carts, six telescopic rescue ladders, one brake, 365 lengths of delivery hose, comprising 21,360 feet, together with other necessary fire extinguishing apparatus. The Bombay fire brigade still lacks a chemical fire engine, without which no up-to-date, or American system is complete. Each steam engine carries with it 600 feet of hose, but the total length available for service exceeds 21,000 feet, a length more than sufficient to stretch from the sea at the Apollo Bunder to Parel.

FIRE LOSS IN BOMBAY NOT GREAT

Considering its size, the narrowness of its streets, the free use of kerosene lamps, often of a defective quality, which everywhere prevails, the inflammatory nature of the buildings, Bombay compares very favorably with European cities, both as to the number, and the extent, of its conflagrations.

The explanation lies in the fact that all the houses are occupied, and the tenants are always at hand to extinguish a fire in its infancy and to at once rectify the damage wrought by the fallen or exploded lamps. Yet the use of a better type of lamp would diminish the number of accidents, and save not only much personal loss, but in some cases human lives. The water supply available for fire purposes is good, so far as it goes; with full pressure one jet only at work a height of sixty feet can be reached; still the mains are not sufficient in number and most of them are too small in area. The diameter of the water mains in the native quarter is but three inches, and a really big fire there would involve the serious danger of a huge holocaust, of a fire which could defy all puny attempts at suppression; for what use is a solitary three-inch water main to deal with a mass of burning matter? In some other localities, the existing mains are insufficient to meet the necessities of the new buildings which are constantly being added to the fire protected areas. Thus the Fort has outgrown its fire provisions. Back in 1896 when the Army and Navy Stores were destroyed, the Secretariat stood in imminent peril; had the conflagration extended in that direction there would have been no water supply available to meet such a calamity. Many handsome and costly buildings have been added to this area since then, yet the insufficient fire mains of 1896 have still to do duty for larger blocks of buildings. Clearly the water supply for fire extinction must be increased proportionately to the growth of the city.

The Improvements Needed in Youngstown

THE discipline of the Youngstown, O., fire department, has been above the usual standard, according to Chief Loller. It was necessary to suspend but one man during the past year.

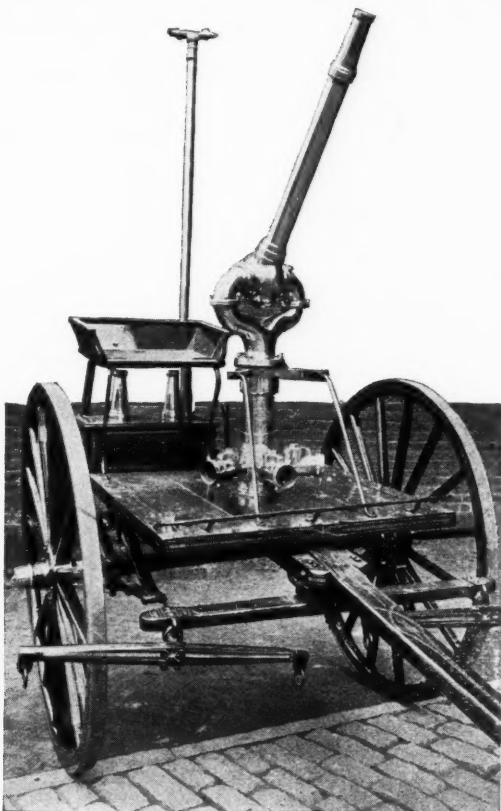
A private telephone system should be installed in the department as the greater percentage of alarms is received by telephone. The alarm system has worked well and the storage battery, just installed, has proven its reliability and economy. The new station No. 7, is to be equipped with a rebuilt hose wagon supplied with a Glazier turret nozzle. He recommended the immediate purchase of a forty-foot truss extension ladder, for the aerial truck. A life net of approved design should be secured for this truck, as the one now in use is not strong enough.

It is wrong to permit the erection of a frame building beside one of better construction and the Chief asked that the fire limits be extended to prevent this. Fire escapes should be placed on buildings over two stories high. All buildings over three stories should also be equipped with standpipes, with connection on each floor. At least three more engines must be purchased before the needs in that direction are satisfied.

The chief renewed his recommendation that permits should be secured before wires are strung in the streets or buildings. Provision should also be made for notifying the department of street obstructions. Gas shut-offs should be placed on the outside of buildings and gas meter connections should be of iron instead of lead, because of the liability of the latter to melt. The Chief asked that better truck service be secured for, at present, both the aerial and light service trucks are operated by the same crew and so one section of the city is always without this service.

Three Fire Monitor Batteries

THERE are two cardinal points in fighting fires: get the water on quickly, and get it on in large quantity. The first depends on the efficiency of the department in answering



SCHENECTADY'S APPLICATION OF THE GLAZIER NOZZLE

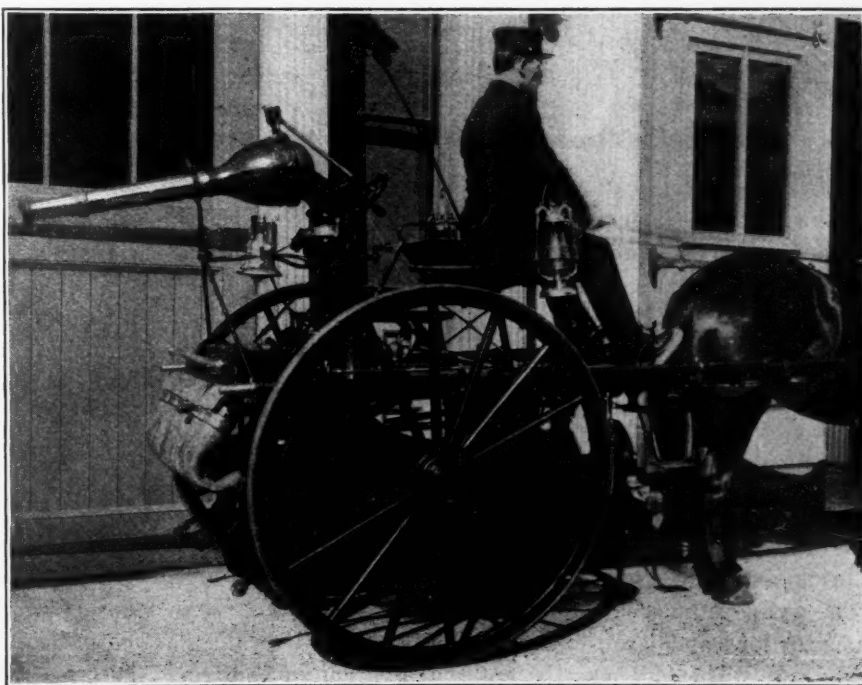
alarms; the second, while depending on the water supply, can be greatly augmented by the use of appliances that will throw the combined product of two or more hose lines in one large and powerful stream. Several appliances for securing this effect have been invented and the accompanying illustrations show three of them.

The first one of these appliances is what is known in the San Francisco Fire Department as the "Monitor Battery" and was invented by H. H. Gorter, master mechanic of the department. It was designed to replace a water-tower in crowded quarters and can be pushed into alleys with ease. When not in action the weight is thrown on the wheels, but when it is brought into play, the table, on which the nozzle rests, is thrown forward and the weight comes between the ends of the shafts and the axle. A back pressure of 1,500 pounds can be withstood, as the ends of the shafts are fitted with spikes. A ball and socket joint permits of raising or lowering the nozzle at any angle and a roller-bearing allows horizontal movement. On the end are six connections for coupling with hose lines from the engines. The total weight of the

battery complete is 1,650 pounds. Several of these machines are in service.

Chief W. R. Joyner, of the Atlanta, Ga., Fire Department, on June 12, 1903, patented a nozzle that is similar to that of Mr. Gorter's, although a simpler device. As in the case of the San Francisco nozzle, it was made in the shops of the department under the direction of the Chief. It has proved of great value in active work of the department and, when a number of streams are siamesed into it, will deliver a stream of one and one-half, one and three-quarters, or two inches. The machine has been in service in the department for a year and a half, although the patent was not obtained until last June. The apparatus weighs 650 pounds. Practical tests of it at several fires have proved the entire efficiency of this machine.

The latest device for utilizing a large nozzle similar to the above, is the invention of Chief Henry R. Yates, of Schenectady, N. Y. It is simply a two-wheeled cart on which is mounted a Glazier Universal Nozzle, a description of which was given in our issue of November, 1903. Chief Yates improved on this device by inventing an attachment by means of which a shower of water is thrown in a circle about the whole apparatus. It is similar in idea to the law sprinklers that revolve automatically and is shown at back of the machine. This device is independent of the rest of the apparatus and can be turned on or off as desired. The spray of water protects the machine from the heat, keeps the air pure about it and so makes it easier for a fireman to stay by the nozzle to change its direction when necessary. The nozzle will remain in any position as long as desired and three streams can be connected to it. Streams one and one-half, one and three-quarters, and two inches can be thrown by changing the nozzle. The apparatus weighs 568 pounds and can be easily handled by the men. So successful did the machine prove itself at once that a second was made and fitted with a three-inch nozzle.



SAN FRANCISCO MONITOR BATTERY

At the first fire at which the new machine was tested excellent work was done. Three lines of hose were connected with the nozzle and a powerful stream was furnished. The advantage of this nozzle is that it can be placed in any desired position and will maintain itself until it is necessary to direct the stream in a different way. Where the ordinary nozzle requires two or more men to hold it, but one man is needed to attend to this one, thus more men are avail-



ATLANTA'S WATER GUN

able for other work. Tests of the nozzle at Schenectady showed it capable of throwing a stream over the highest building in the city. Under such circumstances, the need of a water-tower is obviated. The light weight of both the Schenectady appliance and that of Chief Joyner's gives them distinct advantages, especially in the smaller cities, over the cumbersome water-tower.

Chicago's Theater Fire Ordinance

THE important features that were embodied in the new ordinance regarding theaters of Chicago are given below. There was considerable opposition to several of the provisions of the ordinance, but the ordinance was passed at length. It is very long and consequently but the main points have been brought out here.

Steel curtains must be installed and they must be in constant use as the regular curtain to be dropped between acts. All theaters must be so located that they adjoin two public thoroughfares. All floors, or balconies, of the auditorium and stage must be surrounded on four sides by open spaces, or inclosed fireproof passages, both to be outside of the auditorium and connect directly with either of the thoroughfares. The passages must be eight feet in width and be free of all obstructions and large exit signs must clearly indicate the way out. Theaters must be entirely of fireproof construction and separated from any buildings, not so built, by double iron doors.

The question of floor levels caused considerable discussion, but it was decided that, where the seats were banked, the floor level of the lowest seats should not be above the sidewalk level. Where an audience room contains 500 seats or less and is in a fireproof building, the room may be on any story, but two stairs four feet wide must lead therefrom to the ground.

Stairs must be equal in width to twenty inches for every 100 seats, except that all must be four feet wide and must not extend over eleven feet without a landing. The main floor and every gallery must have entrance stairways from the street and be independent of one another. Aisles must be three feet wide and must lead directly to an exit and not more than ten seats come between aisles. No one shall be permitted to stand in the aisles or passageways during performances and no steps must be built in aisles except as extending from bank to bank of seats and all must be well lighted. There must not be any false door or window.

Emergency exits and stairways must be provided and must be of the same size as the regular exits; they must be made of iron, steel or other non-combustible material. They may be built within the walls of the building if surrounded by fireproof walls four inches thick. If emergency exits lead to fire-escapes, the doors must have metal frames filled with wire-glass and open outwards. All these emergency stairways must lead directly to the streets or alleys.

Iron or steel must be used in building the stage and all wood used for floors, etc., must be coated on the under side with fire-proof paint. All scenery must be similarly treated. Proper flues or vents must be placed above the stage and equal to at least one-twentieth of the latter in area. These vents are to be opened electrically as well as mechanically.

Automatic sprinklers must be provided and the fireman on duty must report daily the quantity of water in the tank. Standpipes must be placed on either side of the stage and be connected with the tank on the roof and in turn with a power pump.

All exits must be marked by oil lamps with red globes and have signs of "exit" in letters six inches high. Theater owners must employ two firemen of experience to be on duty during performances, and they must keep the fire apparatus in order and the exits unlocked. The employees of the theater must be drilled in the use of the apparatus twice a week. All arc lights must be approved by the City Electrician and no calcium lights are to be used.

The *Chicago Tribune* had a committee visit and report on the theaters in the city and the recommendations of the committee were practically the same as the provisions of the ordinance, except that, in addition to the sprinkler system, a practical water curtain should be installed adjacent to the proscenium arch.

Paid Department for Atlantic City

AFTER many months of discussion and indecision, the paid department of Atlantic City, N. J., has become an assured fact. The cost of the paid as against the volunteer force has been figured out by the Fire Commissioners, \$110,000 being the estimated cost of the former and \$106,196 the cost of the latter as given in the report of the Comptroller.

Baltimore's Conflagration

THE great conflagration which devastated the business section of Baltimore, started shortly before eleven o'clock on Sunday morning, February 7, in a large dry good establishment. It was Monday night before the fire was under control, although the back-bone was broken in the forenoon. How the fire started is not yet known, but the first alarm was given from the building on the automatic alarm, calling out an engine, a truck and the salvage corps. As the captain of the salvage corps was about to send in a bell alarm, a terrific explosion took place, blowing out the windows in many of the buildings around and scattering burning embers through the open windows. Thus, at once, were many fires started and the strong southwest wind soon placed the conflagration beyond the power of the firemen to stop it. Chief Horton was soon on the spot and took command, but a broken trolley wire, falling, struck him in the side and severely shocked him, making it necessary for him to retire. District Chief Emerich took charge, but the smoke and heat so affected his eyes that it was necessary for him to turn over the command to District Chief Burkhardt. Before Monday morning Emerich was again in charge.

Assistance was asked from Washington and engines were sent at once, reaching Baltimore in the early afternoon. Engines were also sent from the towns surrounding the city, and Philadelphia and York, Pa., sent contingents a little later. Other engines came from Wilmington, Chester, Altoona, Harrisburg, etc., and reached Baltimore in time for the fiercest of the fight. Nine engines were sent from New York early Monday morning and arrived, after delays, about 1:30 Monday afternoon, just in time to relieve the exhausted Baltimore and Washington men who had been on duty over twenty-four hours.

A fortunate shift in the wind turned the fire just before reaching the Court House, Post Office and City Hall, and it started towards Jones' Creek, which divides the business section from East Baltimore, or the home of the poorer laboring classes. To prevent it leaping this stream, a water battery was lined up along the opposite shore, which, by dint of hard work, prevented the flames from securing a foothold among the frame buildings of which East Baltimore is composed. The fire then ate its way to the wharfs and burned out. Excellent work was done during the fiercest part of the blaze in stopping the fire from consuming the public buildings and houses in the vicinity, and the ruins show where the buildings on one side of the street were entirely destroyed, while the firemen prevented those on the opposite side from burning. At three o'clock on Monday afternoon Chief Horton pronounced the fire under control, although it was many hours before the fire had spent itself.

The loss has not yet been fully and carefully estimated, but it will be approximately \$100,000,000. One of the most remarkable facts about it is that none of the firemen were even seriously injured and but one person is known to have lost his life. This was not the case with the big Boston fire of 1872, when thirteen were killed, or in the Chicago fire of 1871 where over 200 lost their lives. The property loss, however, will prove greater than in the case of the fire at Boston with its loss of \$61,179,300, but is less than that of Chicago where the total reached \$195,672,000.

The stories of the fire that appeared in the different newspapers throughout the country were, unfortunately, in many cases pure fabrications. Firemen from outside cities, who were reported as criticising the work performed by the Baltimore men, have stated that they never said the things ascribed to them. The papers of each city tried, through mistaken pride, to make it out that it was the men of their departments that saved the day. In so doing they not only made their paper appear ridiculous, but also harmed the very men whom they have endeavored to serve. It is unfortunate that the editors rely so much on their correspondents and allow to pass such matter as has appeared.

Winnipeg Needs a New Salvage Corps

"THE safety of the people, as all are aware, is a higher law than a balance in the municipal treasury," and so, Chief Buchanan, of the fire brigade, of Winnipeg, Man., asked that large water mains be installed to enable his men to get the requisite amount of water to do effective work. He asked that all dead ends be connected so as to increase the flow and that more pressure be secured for the business section, which is becoming greatly congested with large buildings. He urged that the erection of the proposed fire stations be pushed and, as the apparatus for these stations, consisting of four chemical engines and four hose wagons, have been delivered, the sections in which these are located will receive much better protection. He recommended that proper entrances be made in front of schools so that the apparatus could get close to the buildings. Chief Buchanan also recommended the necessity of forming a salvage corps and said that this should not be postponed any longer. The only apparatus needed at present is an eighty-five-foot aerial ladder truck. The benefits derived from the chemical engines in service exceeded the expectations of the department.

The strength and equipment of the department at the present time is as follows: Forty-seven men, three fire stations, four steam fire engines, one of which is held in reserve; three hose wagons, three hose reels held in reserve, three chemical engines, one sixty-five-foot Hayes' aerial truck, one Seagrave hook and ladder truck, twenty-six horses, 12,256 feet of two and one-half inch hose, 1,525 feet of chemical hose, 530 street hydrants, of the Corey pattern; fifty-five fire tanks, twenty-one of which are connected direct with water mains, and 100 street fire alarm boxes, ten of which are private property.

Statistics included in the report of the Chief showed that the brigade had responded to 518 calls during 1903; had raised 2,082 feet of ladder; used 7,950 feet of chemical hose and 69,550 feet of two and one-half inch hose; the value of buildings and contents where fires occurred was \$2,622,058.21, upon which \$1,671,300 insurance was carried, and upon which a loss of \$170,160.19 was suffered. During the year the brigade worked 185 hours and 30 minutes. The firemen visited a large number of places to inspect the interiors that they might be familiar with them in the event of a fire. The drill-tower was used by all the men a great part of the year when the weather permitted. The men have thus been able to keep in good condition and fit for any work they are called upon to perform.

WHAT POLICE AND FIREMEN ARE DOING

**London's New Method of Measuring Criminals - First Year of Paid Department in Columbia
—Heavy Fire Losses—Fire and Police Personals**

New Method of Measuring Criminals

THE police of London have introduced experimentally a new measuring system for recognizing criminals. As it has been successful, it will soon be adopted by a number of other police departments both in England and abroad. In this system only the impressions of the fingers are taken. Compared with the "Bertillon" system, it has, above all, the advantage of simplicity, as it can be applied without any contrivances, and is, therefore, much less expensive. Whether it can completely take the place of the Bertillon system remains to be seen. The Berlin police have for the present also inaugurated a card collection of impressions of the fingers for recognition purposes. The new system is called "Daktyloscopy."

Much Apparatus Needed in Houston

UNLESS the apparatus asked for in the report of Chief J. H. Gernand, of Galveston, Tex., is secured, the department will be badly handicapped. He asked that a first or second-class engine with copper boiler be obtained, as well as a combination wagon and hook and ladder. A practice tower is needed to help in the work of the Department. The services of an assistant chief are greatly needed, as the work is getting too much for Chief Gernand. The salaries of the men should be increased, for, to retain good men, they must receive more than enough to just maintain them. More alarm boxes should be installed and a fire-boat is greatly needed to protect the water front. There was an increase of over 34 per cent. of alarms in 1903, 207 having been received. The manual force numbers fifty-three. The insurance involved on buildings and contents amounted to \$337,257.54, the insurance paid was \$48,470.10, and the total loss was \$55,627.10.

Many Improvements Made in Montreal's Department

THE high rates of insurance in Montreal, Que., of which the citizens and municipal officials have been complaining for a long time, should not be longer maintained, because of the improvements in fire service shown in the report of Chief Benoit. The report covers two years and states that two steam fire engines, three hook and ladder trucks, small ladders and a Seagrave extension ladder, nine hose wagons, 20,000 feet of hose, one station rebuilt and two new ones under course of erection, thirty new men added and twenty-two more to be added, and a number of minor improvements have been secured. The insurance companies demanded a number of improvements, all of which have not been complied with, although the above additions cover the main requirements. Since the department has controlling nozzles and hand extinguishers on all the apparatus, Chief Benoit does not consider that the number of chemical engines should be increased. Among the smaller appliances obtained were two water tower ladder attachments, four life nets, three deluge sets, and a number of extinguishers and alarm boxes.

Chief Devine Reports Heavy Loss

THE fire losses in Salt Lake City, Utah, were unusually heavy in 1903, according to Chief James Devine. There were a greater number of fires also than in any previous year. The total loss aggregated \$398,608.46, but over \$360,000 of this amount was involved in two fires. The cost of maintenance for 1904 is placed at \$50,000. Chief Devine recommended that the office of City Electrician and Fire Inspector be created, that he may prevent the installation of poor work and thus aid in reducing the fire loss. Another engine house should be erected in the southeastern part of the city, and that a second-class engine and 1,500 feet of two and one-half-inch hose be purchased. The old aerial truck should be rebuilt and placed in service. Enough men should be added to the force to permit of each member having one day off in seven. There were 182 alarms received during the year and the loss totaled \$1,841,035.41. The value of property endangered by fire, amounted to \$2,161,799, and the insurance paid was \$328,581.46.

First Year of Columbia's Paid Department

THE first report of the new paid fire department at Columbia, S. C., was submitted by Chief W. J. May. The chief has had considerable trouble in getting the department into working order, the volunteers that joined proving slow in getting down to discipline. Eleven men resigned and four were dismissed during the year. Thirty-two fires occurred during 1903, the amount of insurance paid amounting to \$71,338.06, and the insurance carried being over \$22,000 more than double the losses paid. Chief May asked that a building inspector be appointed, as one-half the fires are caused by defective flues. The apparatus in service includes three steamers, a Gleason & Bailey ladder truck, a Holloway chemical engine, four hose wagons, a chief's buggy, 6,200 feet of waxed cotton rubber-lined fabric hose, and two hand extinguishers. The force numbers five companies and there are seventeen horses in service.

Big Fire Loss in Tacoma

THE year 1903 was the most disastrous in the history of Tacoma, Wash., regarding loss from fire. Four big fires in buildings which were regarded by the department with forebodings, occurred, bringing the loss up to \$309,556.15. The insurance involved was \$1,501,100, which shows the size of the properties involved. Several factory fires were numbered among the total and these are the hardest to fight; and last year \$200,000 were lost in four of these. The department responded to 222 alarms, of which 117 were by telephone and thirty-three, verbal. As apparatus was bought in 1903, for the first time in a dozen years, the expenses, which included the cost of apparatus, ran up high. The average cost of operation is from \$40,000 to \$50,000, but last year it was \$69,640.25, including over \$13,000 for apparatus. The Department purchased a first-class Metropolitan engine, a

combination chemical engine and hose wagon, a new hose wagon, and horses. A new hose company was added to the Department. About \$1,500 worth of work was done by the firemen. The apparatus in service at present is:

One Metropolitan engine, first-class; one Clapp & Jones engine, second-class; one Ahrens engine, third-class; one Amoskeg engine, third-class; seven hose wagons, capacity, 1,000 feet of hose; one combination chemical and hose wagon, 150-gallon tank; one Hayes patent extension ladder truck, 65-foot; two chief's buggies; one supply wagon; one Holloway chemical engine double 50-gallon tank; two hand hose carts in outlying districts; five hand hose carts on waterfront.

The following apparatus is in reserve. One Silsby engine, second-class; two Silsby engines, fourth-class; one hose wagon; two village trucks; one chief's buggy.

The following apparatus is out of service. One Holloway chemical engine and double 85-gallon tank; one Lindgren chemical engine, double 80-gallon tank.

There are 17,000 feet of hose in service, and 412 hydrants. The value of the Department's property is estimated at \$112,988.18. The Chief again recommended that a fire-boat be obtained to protect the valuable property along the water front.

Fire Equipment in Jersey City

THE manual force of the Jersey City, N. J., Fire Department during the past year consisted of 190 men, divided into thirteen engine, six truck and three chemical engine companies. There are in service twelve second-size double engines, six two-horse hose wagons, four one-horse hose wagons, three four-wheel reel tenders, three two-horse chemical engines, six hook and ladder trucks, five officers' wagons, one supply wagon and three coal supply wagons. In addition to apparatus in service there is spare apparatus, consisting of one third size steam engine, one hook and ladder truck, one four-wheel tender, one two-wheel tender, one officers' wagon.

The department possesses 26,600 feet of two and one-half-inch Eureka cotton hose, 1,000 feet of one-inch rubber hose, 104 feet of three and one-half-inch of Eureka cotton rubber lined hose. All of this hose is in use, but the department has in reserve 1,750 feet of two and one-half-inch Eureka hose in bad condition. About 1,000 feet of old hose is held for the purpose of being loaned to private parties for the cleaning of sewers.

Chief Conway recommended the purchase of two new engines, two new trucks, a new engine house, and two hose wagons. The addition of two men to each company is also greatly needed.

Trial of Paid Fire Service Successful

THE first year of the part paid fire department of Hornellsville, N. Y., has passed and Chief J. M. Hederman considers that, while perfect service was not possible at the start, the beginning of a good service has been instituted. The department now consists of a station in which the men are all paid and which is equipped with a combination wagon, with 1,000 feet of hose, a reserve hose wagon with an equal amount of hose, and a ladder truck. This station has five

paid men and six call men. The rest of the department consists of three hose companies, with a membership of sixty volunteers each. Fifty-three alarms were responded to during the year and the insurance loss was \$28,102.59, or two-thirds of that of 1902. The insurance rates have been reduced on account of the introduction of the paid men. It is a noteworthy fact, according to the Chief, that the paid portion of the department was installed without loading the city with the burden of a large appropriation. More money was spent this past year than will be the case for years to come, because it was necessary that the city buy equipment. One feature of the alarm system should be altered and that is the one-circuit system. At least three circuits should be installed. A storage battery should be added, as the gravity battery is expensive and inadequate. New alarm boxes should replace the old style in use. The top cross-arms on all poles should be reserved for city wires, a deluge set should be secured, and the fire engine should be put in service.

Fire and Police Personals

—Chief Corey, of the Brookline, Mass., police, has been accused of profanity and discourtesy by a prominent physician of the town.

—The Circuit Court of Hamilton County, O., recently handed down a decision ousting Chief of Police C. A. Stroble, and Fire Chief David Lingler, both of Hamilton, O., from office, installing Jacob Sipp and Adam Becker.

—The first part of February, Superintendent of Police William Coughlin, of Troy, N. Y., was suspended by Commissioner of Public Safety Webster, following charges made against the superintendent. Alleged neglect of duty and conduct unbecoming an officer, were included in the charges.

—Chief Benoit, of the Fire Brigade of Montreal, recently asked for a number of Protestant young men to enter the service. The practice is to employ a certain percentage of French, Irish, and Protestant firemen, but the last is not well represented. This is a state of affairs that the Chief desires to remedy and he now desires only Protestant men.

—Fire Chief Victor R. Grove, of Steelton, Pa., has just organized a fire patrol of twelve men. These will be under the direction of Police Chief J. T. Buser when attending fires. They will form fire lines with ropes and keep out all not wearing fire badges. They will also help to remove furniture and be responsible for the safety of the saved contents.

—Bayonne, N. J., has a police board to take the place of the Police Committee of the Council in the trial of policemen charged with various offenses. Heretofore, the political influence of the policemen was considered potent in mitigating punishment, but it is expected that the Police Board will not be influenced by anything but a sense of duty. The members appointed are: Ex-mayor Seymour, Samuel Graham, and John J. Cain.

—Chief Edward H. Oakes, of the Revere, Mass., police department, has resigned voluntarily, although there were many petitions to accomplish the same thing. His period of service has been a stormy one, including, as it did, the invasion of the State police, their sensational raids and the equally sensational trials in the courts. Four of the five selectmen stood by the Chief. No appointment to his office will be made until after the March elections.

LITERATURE ON MUNICIPAL TOPICS*

Reviews of Some Important Books—What the Magazines and Reviews Have to Say About Civic Affairs—Municipal Reports Received

Books

It is but a few years ago that the use of bacterial action in the purification of sewage was first employed and, at the present time, much research and experimenting remains to be done before the best means of utilizing this action in different kinds of sewage can be determined. Yet, big steps have been taken toward this end, and the best practice to date is given by W. J. Dibdin, F. I. C., F. C. S., in his *Purification of Sewage and Water*. This is the third edition of this work and much change has occurred since the first edition, because of the advances made in the knowledge of the subject. The author presents a strong argument for the superiority of bacterial treatment of sewage over all other forms, although he suggests the use of chemical treatment in connection with bacterial when the character of certain sewages demands it.

In the first chapter he takes up the purification of sewage in general, the character of this substance, and the action of bacteria on it. Antiseptics receive attention in the next chapter and precipitations in the third. The rules for precipitation are given at the end of this section. Experiments at Massachusetts, London, and Sutton with passage of sewage through bacteria beds, are then given and will be of value. In Chapter VI. attention is given to the septic tank and other systems of purification, telling of the work of Donald Cameron and others. Chapter VII. takes up the subject of "Land Treatment vs. Bacteria Beds," showing the failure of the former. The experiments of Manchester and Leeds in determining the best treatment for sewage are given in Chapters VIII. and IX., which include the reports of the commissions. Chapter X. is devoted to "The Bacterial Treatment of Factory Refuse," Chapter XI. to "Screening," with a diagram for an automatic screen, and Chapter XIII. to "The Purification of the Thames," "The Discharge of Sewage into Sea Water" is taken up next, showing the effect on shell fish.

The second section of this work, that devoted to water purification, starts off with a chapter on "The Filtration of Potable Water," taking of the subjects of softening, filters, etc. The next chapters deal with "The Systematic Examination of Potable Water," "The Character of the London Water Supply," "The Action of Soft Water on Lead," showing the danger from the use of lead pipe, "The Absorption of Atmospheric Oxygen by Water," "Analyses and Their Interpretation." The important subject of the ventilation of sewers and their deodorization is given a chapter, the evidence showing that sewer air is similar to the air of the street above and that the bacteria of sewage are not present in the air of the sewers. The last chapter takes up the work of the Royal Commission on Sewage Disposal. Two appliances give instructions on the examination of matters in suspension and the determination of dissolved oxygen. The work is well supplied with valuable tables and diagrams and should be in the hands of all who are interested in these subjects or

contemplate the introduction of sewage disposal in their cities. Cloth, 379 pages, \$6.50. v.

This, the eighth year of publication of the *London Manual* and the success it has met with in the past, will be more than equalled in this edition for English municipal officials are looking to it for their information concerning the greatest of all cities. Officials in American cities also find it of benefit in learning "how they do it" in London, where so many of the public utilities are so much further advanced than in America. The *Manual* is so well arranged that it is very easy to find whatever information concerning the operation of the London borough governments is desired. The organization of these boroughs, their powers, the work of the London County Council, and the different directions in which municipal ownership is advancing in Greater London, are set forth in this volume. American officials should possess copies of the *Manual*, for, not only will they be interested in learning about municipal government in the metropolis of the world, but will also obtain many suggestions adaptable to the improvement of their own cities. There are 360 pages "chock full" of interesting data. The price places it within the reach of all, 50 cents.

The report of the third annual convention of the Union of Canadian Municipalities contains a number of interesting papers and addresses delivered at the sessions of this meeting which was held at Ottawa on September 16-18, 1903. The constitution of the Union and its purposes and benefits are also printed in this edition. The discussions that were held on the various topics before the convention, are of great value. The appendix to the report contains Ottawa's anti-spitting ordinance, restrictions imposed on the Bell Telephone Company, etc. The report was prepared by the Honorary Secretary-Treasurer, W. D. Lighthall, ex-mayor of Westmont.

Municipal Trade, by Major Leenard Darwin. An English work showing the advantages and disadvantages of municipal ownership. Cloth, 8vo., 465 pages, \$3.50 net. d.

Experimental Researches in Reinforced Concrete, by Armand Considere, translated by Leon S. Moisseiff, C. E. Cloth, 188 pages, numerous diagrams, \$2. m.

Theater Fires and Panics; Their Cause and Prevention, by William Paul Gerhard, C. E. Cloth, 175 pages, 12mo., \$1.50. w.

Periodicals

The December issue of the *Journal of the New England Water Works Association* contains a number of valuable papers of interest to water works men. Frank C. Kimball, Superintendent of Water Works, Knoxville, Tenn., contributes the results of *Some Six-inch Meter Tests and How They Were Made*. *The Reciprocal Obligations of the Man-*

* Any book or periodical reviewed or mentioned in THE MUNICIPAL JOURNAL, or elsewhere, will be sent to any address on receipt of price.

agement of a Water Supply System and the Community, by John O. Hall, ex-mayor of Quincy, Mass., discussed this important problem. F. H. Pitcher, Chief Engineer of the Montreal Water and Power Co., talked about *Pumping by Electricity* and describes the work of his company along this line. Frank L. Fuller, C. E., described the work of *Covering the Natick, Mass., Reservoir with a Concrete Roof*. Boston, Mass. Price per year, \$3. Issued quarterly.

A short description of the *West Ham Tramways* appeared in the issue of January 22, 1904, of *The Municipal Journal*, of London, Eng., showing how municipal ownership of this street railway was brought about. London, Eng. Price per year, 8s, 8d.

The First German Municipal Exposition is described in the January issue of the *American Journal of Sociology*, by H. Woodhead. This is the first paper and takes up the subject of "Traffic," including streets, railways, bridges, etc., and "Expansion," dealing with the board of public works, suburban movement, housing. *A Model Municipal Department*, by F. R. Cope, Jr., is the first paper on how the last administration of New York City cared for the health of the community, or the workings of the Department of Health. Chicago, Ill. Price per year, \$2.

Freezing as an Aid to Excavation in Unstable Material, by James H. Brace, C. E., appeared in the January issue of the *Proceedings* of the American Society of Civil Engineers. This is a synopsis of the literature on the subject showing the different methods of freezing earth for the purpose of excavation when the earth was of such a character that it could not be handled well in its natural state. The method was especially applicable to quick-sands. New York, N. Y.

In *McClure's Magazine* for February appeared an article by Ray Stannard Baker on *San Francisco Under the Labor Unions*, showing what condition the city has gotten into because of the domination of these organizations and how other cities will be as badly off if labor unions get the upper hand. New York, N. Y. Price per year, \$1.

Mixing and Placing of Concrete, by Samuel H. Lea. *Mines and Minerals*, beginning October, 1903.

The Superstructure of the Manhattan Bridge Across the East River at New York City. *Engineering News*, New York, December 10, 1903.

Street Lighting in Berlin; a Comparison Between Electric Arc Lights and High Pressure Gas Burners. *Journal of Gas Lighting*, London, Eng., December 8, 1903.

Smoke Prevention, by W. H. Bryan. *Railroad Gazette*, New York, December 25, 1903.

The Cost of Earth Excavation by Steam Shovel, by Daniel J. Hauer. *Engineering News*, New York, December 31, 1903.

Use of Medina Sandstone for Pavements in Brooklyn, N. Y., by C. D. Pollock. *Engineering Record*, New York, December 26, 1903.

Raising the Grade of Galveston. *Railroad Gazette*, New York, January 1, 1904.

The Cost of Concrete Tunnel Lining and of Tunnel Ex-

cavation, by George W. Lee, C. E. *Engineering News*, New York, December 17, 1903.

Sewage Disposal in Iowa, by Prof. A. Marston. *Journal*, Western Society of Engineers, Chicago, December, 1903.

The Typhoid Fever Epidemic at Butler, Pa., by George A. Soper, C. E. *Engineering News*, New York, December 24, 1903.

The Farington Sewage Disposal works. *Engineering Record*, New York, December 26, 1903.

Concrete-Metal Construction, by Emile Villet. *Journal*, Associated Engineering Societies, Philadelphia, October, 1903.

Siphon for the Guernsey Water-Works, by G. H. Perryn, C. E. *Minutes of Proceedings*, Institute of Civil Engineers, London, Eng., Vol. 154.

The Kennicutt Water Softener. *Engineering*, London, Eng., December 11, 1903.

The Mechanical Filter Plant for the Danville Water Company. *Engineering Record*, New York, December 26, 1903.

The Failures and Possibilities of Water Filtration, by Allen Hazen, C. E. *Engineering News*, New York, December 31, 1903.

Electric Lighting in New England, by C. L. Edgar. *Electrical Review*, New York, January 9, 1904.

Street Lighting in Eleven English Cities, by John Price. *Gas World*, London, Eng., January 9, 1904.

Street Lighting in Eighty-seven English Towns, by A. E. Nichols. 17 column table. *Gas World*, London, Eng., January 9, 1904.

Lighting Streets with Scott-Snell Incandescent Gas Lamps in London. *Journal of Gas Lighting*, London, Eng., December 29, 1903.

European Gas Works. Statistics collected by O. Moegestue. *Journal of Gas Lighting*, London, Eng., January 5, 1904.

Municipal Reports Received

WE have been favored with the report of the Water Board of Cambridge, Mass., for 1903.

The annual report of the Lamp Department of Boston, Mass., for 1902, has been received.

The sixth annual report of the Statistics Department of the city of Boston, Mass., has been sent us.

The City Comptroller of St. Paul, Minn., Hon. Louis Betz, has favored us with a copy of his last report.

The compliments of Mayor John Weaver, of Philadelphia, Pa., accompany the reports of the city departments for 1902.

We have received a copy of the report of the Office of Public Road Inquiries for 1903 by the Director, Martin Dodge.

Hon. Charles S. Baxter, Mayor of Medford, Mass., has favored us with his annual message to council, 1904.

We have received a copy of the report of the Board of Police of Fall River, Mass., for 1903.

The fifth annual report of the Water and Light Department of Duluth, Minn., has come to hand.

The compliments of David Ross, Secretary of the Bureau of Labor Statistics of Illinois, accompanied a copy of the twenty-first annual coal report, included in which is the report on the Illinois Free Employment Offices.

REVIEW OF MUNICIPAL REPORTS

How Boston's Streets Are Lighted—Either a New Pipe Line or the Meter System Necessary to Save Cambridge's Water Supply—Free Water for Fire Service

Lighting Boston's Streets

ON account of the death of Mr. John Drohan, in August, 1902, Mr. James Donovan was appointed acting superintendent of Lamps of Boston, Mass., and his report for 1902 shows the number of different kinds of lamps in use and the prices paid by the city for each. Few new lamps were installed on account of lack of appropriation, the number being but 267. A number of common naphtha lamps were changed to Welsbach naphtha lamps. At the time of the report there were in use 9,124 Welsbach gas lamps at \$30 per year, including care and lighting and supplying the lanterns; the city sets the posts and lays connections to the mains. The number of common naphtha lamps was 1,661, and of Welsbach naphtha, 438. These lamps are located in suburban districts and alleys where there are no gas mains. The rates for these lamps are \$22.81 and \$30 per year respectively. The electric companies supplying light set all the poles as directed by the Superintendent of Lamps, and must maintain them as well as the lines. The new arc lamps are enclosed series arcs of 500 watts. The schedule prices range from \$127.75 to \$109.50, according to the number of lights supplied. Up to January 10, 1903, the number of arcs in use was 3,670, and the prices were \$120.45 for 3,081 lamps, \$124.10 for 327, and \$127.75 for 262 lamps, according to the company supplying them. There were thirty-eight 32-candle power incandescents for which \$2.50 and \$3 is paid for some and 1 cent per lamp hour for others. The number of hours of burning for each lamp is 3,828 hours per year.

Cambridge Needs Increased Water Supply

ONCE again the Water Board of Cambridge, Mass., called attention to the waste of water in the city and suggests that the more general introduction of the meter system be pushed. The water situation is becoming a serious one because of the greatly increased consumption, out of proportion to the increase in population, and the inability of the present supply mains to furnish the city with water for this ever-increasing need. The pipe line from the reservoir has become greatly clogged by vegetable growths and must be cleaned. The board again recommended that a new line should be constructed so that one could be cleaned without shutting off the water and that an increased supply could be carried to the city. The present line consists of 5,100 feet of thirty-six-inch and 34,340 feet of thirty-inch cast iron pipe. Even if the cleansing increases the flow, a new line is needed. Mr. Freeman C. Coffin, an expert hydraulic engineer, was employed by the Board to investigate the needs of the city regarding an increased supply of water and made an extensive report in which he discussed the cleaning of the present pipe line and the need of an additional line. In considering the consumption of water, he reported that the supply of water would probably run short in the coming summer, provided that there be no increase in consumption over 1903. If the

present rate of increase be maintained, the shortage will come sooner. The only practical method, according to Mr. Coffin, of decreasing the consumption is by the installation of meters, for they would control needless waste and reduce the expenses of the Water Department without restricting liberal use of water. He shows the economic results of the use of meters and, although 9,137 more meters must be introduced to complete the service metering, the annual cost of maintaining each meter would be \$2.15, which would provide for the renewal of the meter after sixteen years, in addition to all the other necessary expenses. Carefully considering the consumption in the different localities, Mr. Coffin thought that an intelligent application of about 3,000 meters would result in a marked decrease in the per capita consumption, or rather in curtailing the waste.

Superintendent Edwin C. Brooks stated, in his report, that the total amount of water pumped was 3,160,704,360 gallons, of which 1,074,317,752 gallons were sold by meter; 60,500,000 gallons was the estimated amount used for sprinkling streets, 4,000,000 for sewer flushing, 7,500,000 for cleaning sanitariums, 34,776,533 used in public buildings, 35,000,000 for drinking fountains, 2,500,000 for fire purposes, and 34,350 for testing meters. The public buildings are all metered. The number of gallons for each inhabitant on the total amount pumped was 89.56 daily. The number of gallons daily for each inhabitant on the total amount used by domestic meters, including water for flushing pipes, blowing dead ends, puddling trenches, and for hose and private stables, was 55.03. There were twenty-eight drinking fountains, of which four are supplied with ice at a cost of \$1.06 per day. The number of meters in use was 2,264 on domestic supplies and manufactories; sixty-two on public buildings.

No Charge for Water for Private Fire Service

THE question of whether cities should charge for private fire protection has been under discussion by the various water works associations throughout the country in order that an equitable rate may be charged for this service by the cities. The Water Board of Lowell, Mass., however, has not yet set a price on water for this character of service, and has granted every application for private fire service. The expense of laying pipes is borne by the owner of the premises, but he pays nothing toward the maintenance of the service, the cost of inspection, the water used, or the rights obtained. There were 10,984 services in use, according to the last report of the Board, and 7,129 meters. The per capita consumption of water was reduced from 69.24 in 1890 to 57.29 in 1902. The cost of pumping per million gallons is now \$18.84 as against \$8.99 in 1890 while the price of water was 15 cents per 100 cubic feet on a flat rate in 1890 as against 14 cents with a 10 per cent. discount in 1902. During the period the population increased 30 per cent. and the number of water takers 25 per cent., yet the consumption remained about as in 1890. The cost of pumpage is increased because in 1890 only two crews were employed and the water pumped eighteen hours, while at present three crews are needed and the pumping carried on twenty-four hours. The city is getting much better water for less money than was possible twelve years ago.

Wagons for Cities and Contractors

THERE is no economy in buying cheap goods of any kind. The business man spends little of his time looking for bargains. These statements are as true of wagons, perhaps more so, as of any other commodity to be found in the market. The Watson wagon is well known, but it may be well for the readers of the MUNICIPAL JOURNAL AND ENGINEER to restate a few facts about it.



WATSON TWO-YARD GRADING WAGON

Mr. D. S. Watson, of the Watson Wagon Company, Canastota, N. Y., invented and put on the market the first bottom dumping wagon at about the time the West Shore Railroad was built.

The first wagon was built in a small shop entirely by his own hands. From that beginning the business has grown until it now occupies an immense plant, equipped with latest labor-saving machines capable of turning out ten wagons per day.

The dumping wagons have become well known and indispensable to general contractors. They save one-third to one-half of the cost of moving any material which can be dumped. The popularity of this particular dump wagon has been due largely to the policy of the manufacturers in building a wagon of the highest class of material in every part.

They have never endeavored to build a wagon which would sell at a cheap price, upon the theory that so shrewd an individual as the average American contractor would be willing to pay for a high grade article so soon as he was convinced that it was high grade. Acting on this theory they have used Adirondack red birch in their bodies where pine spruce or cottonwood could have been secured at half the price and they have used strictly second growth white oak rims and spokes when lower grades could have been used at a saving



Ash or Garbage Wagon.

of 33 1/3 per cent. They employ skilled mechanics on day wages instead of cheap machine men on piece work.

Some of the technical points of superiority in this wagon are the elbow hinge, bringing the bottoms up outside of the side boards, allowing the load to dump freely and prevent the possibility of the material catching in the hinge and damaging the body when the bottoms are closed.

The perpendicular arrangement of the sides and ends of the box or body leaves no chance for wet and sticky material to cling to the inside of the box to be removed by shovels. Also the chains constituting the dumping arrangement are all on the outside of the body

and the aperture in the bottom of the box being as large as that at the top, anything which goes into the wagon must fall through instantly and easily when the bottoms are released.

This concern makes a specialty of dumping wagons, its whole plant and equipment being designed for that particular purpose. It builds wagons in any size, from one to seven cubic yards capacity. The sizes are, however, divided into three different classes.

The one and one-half and two cubic yard unlined wagons are especially designed for general contractors hauling earth, broken stone and other material of that character.

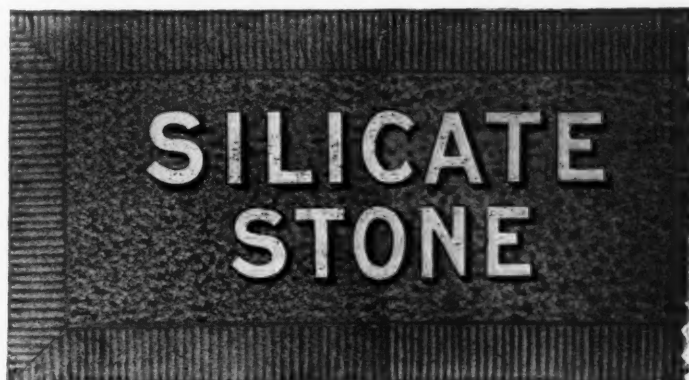
The two and two and one-half cubic yard wagons are especially designed for hauling asphalt, although they can be used for grading purposes as well. They are lined with patent leveled sheet steel with asbestos between wood and steel lining, which keeps the heat in the asphalt and out of the wagons, and are mounted on coil springs.

The wagons of three to seven cubic yards capacity are especially designed for hauling ashes and street sweepings and are sold largely to municipalities and contractors for the above purpose.

A New Building Stone

It is announced that the Ford patent process for the manufacture of silicate-of-lime stone for building purposes has been secured by Mr. Walter W. Iff, of 39 Wall street, New York.

This stone is made with 90 to 95 per cent. of sand, mixed with



5 to 10 per cent. of lime, the process being very simple. These two elements are combined under heat and pressure, forming a chemically combined stone, not moulded, no Portland cement being used. It is turned out in large ten-ton blocks, ready to be sawed, cut, carved and hewn into shape according to the architect's designs.

It is also claimed for this stone that the process is exceedingly cheap, and that it is now being made on a commercial scale in England at as low as six cents per cubic foot. What it will be made and sold for in New York City is not stated; but with Bedford stone, which is the nearest approach to "silicate stone," selling at seventy cents per cubic foot, the demands for "silicate stone" should be very heavy.

It is the intention, we are informed, to establish plants at different points throughout the country. To raise funds for this purpose, one million dollars of the company's stock will shortly be offered to the public.

Injunction Against Neptune Meters Dissolved

THE judges of the U. S. Circuit Court of Appeals for the Third Circuit, on January 23, 1904, reversed the judgment of the Circuit Court of the United States for the District of New Jersey in the case of the Neptune Meter Co., et al., vs. the National Meter Company. The former company appealed from the decision of the lower court, which had granted a permanent injunction restraining the manufacture and sale of water meters with "frost" bottoms, on which the said National Meter Company claimed to have secured sole rights by reason of the patents granted L. H. Nash, assignee to said National Company. The higher court has decided that said patent was not a valid one, inasmuch as Nash was not the first to discover that "the

expedient (weakening the enclosing-head) was available to avert the danger from excessive pressure caused by the freezing of water in an enclosed chamber." The decree of the lower court was, therefore, reversed, with costs, and the case remanded with direction to enter a decree dismissing the bill, with costs, to the appellants, the Neptune Meter Co. This finally disposes of the case and restores to full and free use of the Trident Breakable and Spring Frost bottoms.

Schillinger System Concrete Construction

It is true that many new methods, or modifications, of re-enforced concrete, that have been used in recent years, have proven a total failure and a loss to many lives. Never, however, has there been a collapse of a structure where re-enforcement was properly used and applied in the right direction. Every single failure is due either to the use of re-enforced concrete of faulty construction and designs or, in many cases, to the improper placing of steel, as will be noted in the latest collapse of a concrete building at Corning, New York.

For the last twenty years the Schillinger Bros. Company, Seeley and Fullerton avenues, Chicago, made a specialty of concrete for constructions and has, in the past few years, installed over 5,000,000 feet of concrete floor construction, which is certainly a record worthy of attention from those contemplating constructions of this nature. No expense has been spared and continual tests are carried on at its new plant, which has lately been completed and in which three distinct and different types of concrete construction were employed. It is now installing the necessary machinery for the manufacture of the re-enforcing materials used in its contracts.

Fig. 1, as reproduced from photograph taken of concrete beam ceiling (Parmelee Stable), is a building 280 feet by 175 feet, three stories high. Each floor has over 40,000 feet of surface. A test of 1,800 pounds to the square foot of floor surface was made and, with this load, the floor showed no deflection. The floor beam construction is illustrated in Fig. II and, as will be noticed, the concrete beams are placed five feet six inches on centers and twenty-five feet between bearings. The second floor contains stalls for over 400 horses, which are continuously moving about and pawing. In addition to this live load, there are tons of oak posts and partitions, used in the construction of the stalls, bins, troughs, etc. The bottom face of the cement beams are eight inches in width and the floors are four inches in thickness; the projection of concrete beams below the ceilings is eight inches, making the entire depth of the beam twelve inches. Fig. II is a side view and a cross section, showing the

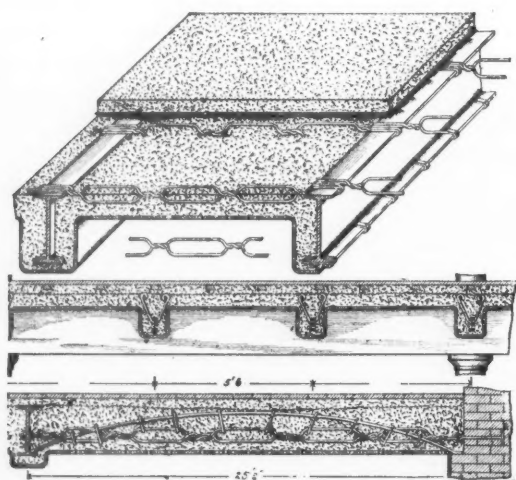


FIG. II

twisted chains placed five feet on centers, anchored to the walls at one end and into the girder at the other. These steel girders are placed twenty-five feet on centers and are carried on posts. Twisted chains are set in a vertical direction acting as a tension member and, in addition to these two chains, there are placed two truss rods tending to act as resisting members. Chains and truss rods are held in

place by the use of V-shaped stirrups or separators placed on an incline, thus completely re-enforcing in a vertical and horizontal direction, an item of the utmost importance in large span concrete construction. It has been repeatedly admitted by leading engineers, both in this country and abroad, that horizontal re-enforcement, or re-enforced beams, might be safe under a heavy load, but in spite of

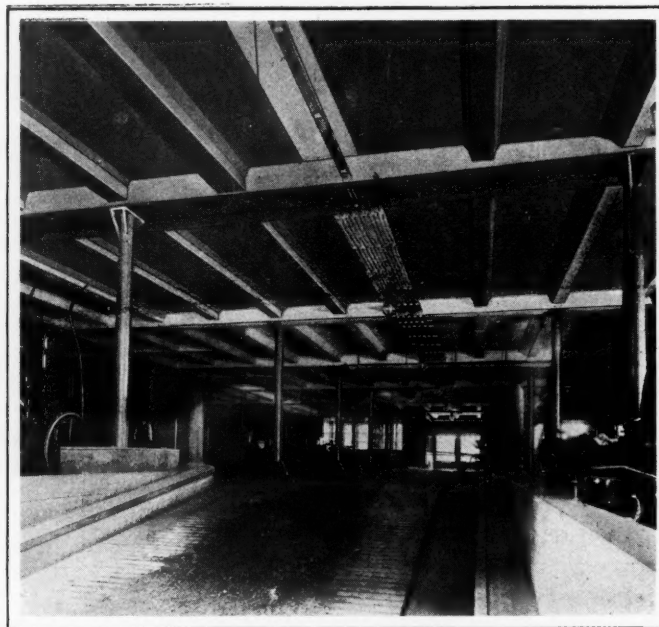


FIG. I.—SCHILLINGER CONCRETE BEAM CEILING IN STABLE

its heavy load capacity tests would not withstand a sudden jar or vibration, and, as further evidence, the recent failures in large span concrete construction have disclosed defects; plain rods and cables have been employed without the use of vertical re-enforcement members. Vertical re-enforcement is certainly of more importance than many engineers and contractors will admit. From a glance at the work that is constructed by European engineers, it will be seen that vertical re-enforcement is the fundamental principle in the use of re-enforced concrete construction for large spans.

Too much attention cannot be paid to the metals used for the re-enforcing and they must be uniformly distributed in proportion to existing strains at given points. Metals must be of such designs and high uniform quality to insure bond with the concrete. It is very evident that two bars of steel twisted together with openings at close intervals and imbedded in good concrete will not slip or loosen from the same.

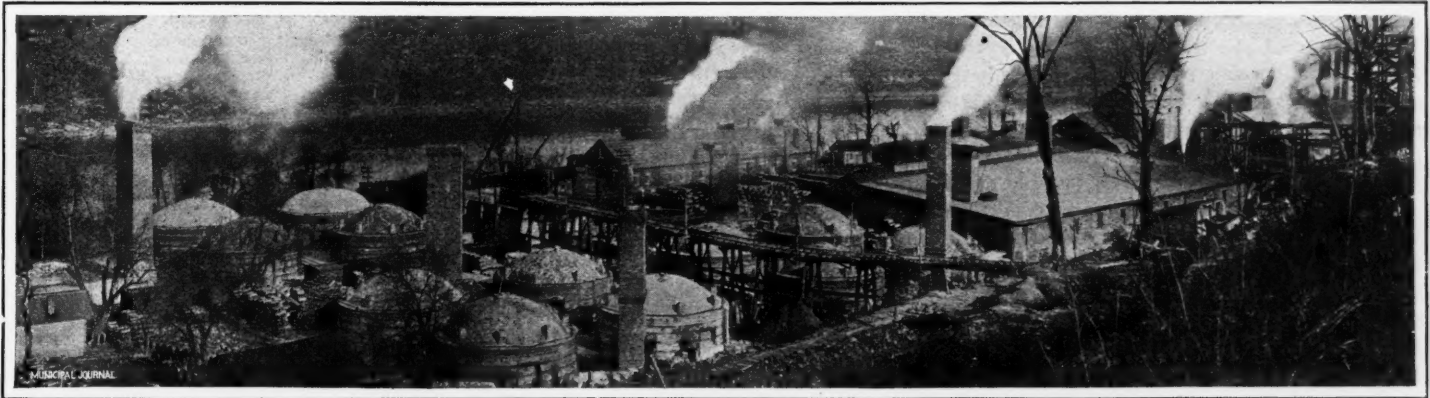
New York Central and St. Louis Exposition

In preparation for the coming Exposition at St. Louis, the New York Central Railroad has issued an attractive folder containing a large amount of information concerning the Exposition and how to get there. There is a map of the grounds and an outline map of St. Louis, showing the street car lines. A number of illustrations show some of the interesting features to be seen on the grounds, and there are short sketches, giving the principal statistics and facts about the Exposition. Forty-nine States have raised \$6,739,986 and the Government of the United States has appropriated in all \$6,488,000. A large number of foreign governments have also made liberal appropriations for their exhibits. A list of the amusement concessions is also given in this circular. The train service on the New York Central will be all that can be desired, as it is at all times. The three trains, "South-western Limited," "Cincinnati and St. Louis Limited," and the "Exposition Flyer," leave at noon, afternoon and night, and these, with many other trains, will provide an admirable service. The route which these trains travel is renowned for its beauty, and the excursion from New York, or Boston, to St. Louis is well worth the trip, irrespective of the Fair at the other end of the journey.

Pittsburg-Buffalo Sewer-Pipe and Brick Plants

ONE of the recent successfully launched sewer-pipe and brick plants in the country is that operated by the Pittsburg-Buffalo Company, the accompanying illustration giving an idea of its magnitude, at the same time only showing the works proper. The property of the company at this point embraces 5,000 acres, with a railroad and river frontage of three miles, located at White Rock Station, Pa., on the Buffalo and Allegheny Valley Division of the Pennsylvania Railroad, thirty-three miles north of Pittsburg, making it an exceptionally

The lamp is especially constructed for contractors on municipal work, for they will burn in any weather and may be hung on a pole or placed wherever it is convenient in order that the light may be thrown on the place where the men are working. The torches that are usually employed for street and similar work are not at all satisfactory, as the flame is not steady, the light poor under the best conditions, and the area of illumination very limited. The Arthur lamp can be used under the same conditions, while the light is steady and brilliant, irrespective of the wind and weather, and the area of illumination is as large as that of the electric arc. These



SEWER PIPE, BRICK AND HOLLOW BLOCK WORKS, JOHNETTA, PA., WHITE ROCK STATION

well located shipping point in the industrial center, as well as all other markets for its products.

The sewer pipe machinery and press are of the latest pattern, built by the Taplin, Rice Company, and, with thirteen twenty-eight-foot and two thirty-six-foot down draught kilns, this company has a sewer pipe capacity of one mile daily. The brick machinery is of the best and latest pattern, the brick plant having a capacity of 100,000 tons daily. There are three modern represses, capable of turning out daily 50,000 repressed brick.

Recently, while driving a shaft for mining coal, this company was fortunate in finding a twelve-foot vein of high grade fire clay, which, coupled with its rock shale, has given it the best of mixtures for making the best class of sewer pipe and buff repressed paving brick, wire-cut paving brick, building and mill brick. Recent tests of its mill brick show a Fahrenheit test of 2,700 degrees, and tests made of the paving brick show an abrasion loss of less than 2 per cent.

This company owns several large gas wells on its property, which furnish an excellent fuel for the burning of its products in the best possible manner, and the brick and pipe have given universal satisfaction everywhere.

In addition to its extensive brick and sewer pipe business, this company is the largest independent producer of coal in the Pittsburg district.

The general offices of the Pittsburg-Buffalo Company are located in the Frick Building, Pittsburg, Pa.

The Arthur Kerosene Lamp

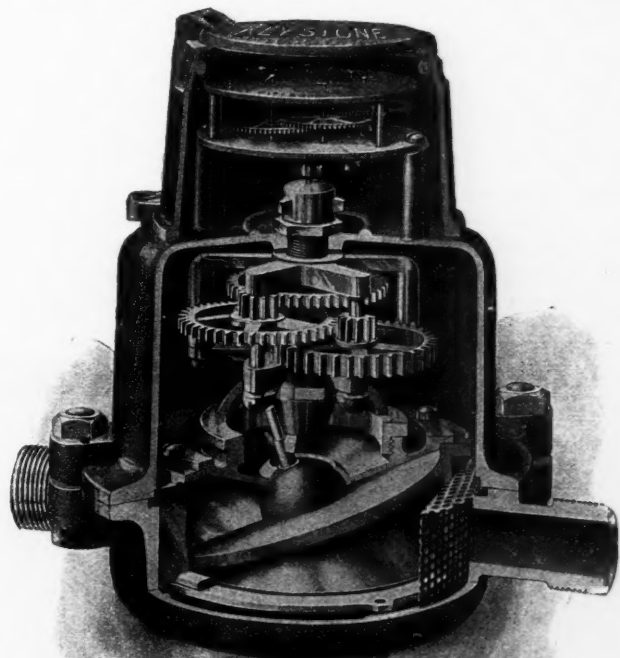
THIS lamp has a guaranteed candle-power of 2,000 and over which is obtained by burning gas generated from kerosene oil. One gallon of oil will supply sufficient gas to keep the lamp at its full capacity for from twelve to fifteen hours. After the oil is placed in the lamp, air is pumped in until the requisite pressure is secured. This forces the gas through a tube about three thirty-seconds of an inch in diameter. The lamp may be moved almost any distance from the tank by lengthening the tube. A patented needling device is attached so that a quarter turn of a ring needles the lamp in a moment. No expert operator is thus required to attend to the lamp. As there is no explosion when lighting, the mantles on these lamps last much longer than they do on gas burners. It is advised that, after every 350 hours of burning, the vaporizer should be cleaned. To assist in this, an extra vaporizer is supplied with each lamp and it takes but a minute or two to change, when the old vaporizer may be cleaned at leisure.

lamps are much cheaper to operate than either gas or electric lights, while the light is very much greater. One of the strong features about them is their compactness, which makes them easily transportable. They are large enough to hold five gallons of oil, or sufficient to last sixty hours, burning under any circumstances.

Full particulars may be obtained by writing the Arthur Light Company, 117 Walker street, New York City.

Keystone Disc Meter

As the name "Westinghouse" stands for quality, so the word "Keystone," as applied to a water meter, is a guarantee that care and thoroughness has been exercised in its manufacture. The question of the service that meters render in preventing waste of water, and all the attending evils, has been discussed so often and has been decided so many times, by that prover of all theories,



experience, that there seems little need of argument as to the use of the water meter *per se*; the question now is, what is the best water meter to choose?

The Keystone water meter is of the type known as the disc meter and simplicity is one of its strong points. This meter is made in all sizes from five-eighths-inch to six-inch, inclusive, and connections are furnished for the various sizes to meet the requirements of standard usage.

The various parts of the meter are interchangeable, and on account of the simple ports or waterways, this meter has a very large capacity, resulting in a minimum of wear to the working parts, without reducing the pressure of the line.

A feature of the meter is that the strainer is so placed as to protect from foreign matter the intermediate gear, as well as the disc chamber and disc. As the connections are attached to the lower shell of the meter casing, it is possible to remove any of the other parts of the meter without detaching it from the pipe line. This will prove of great convenience when cleaning the meter.

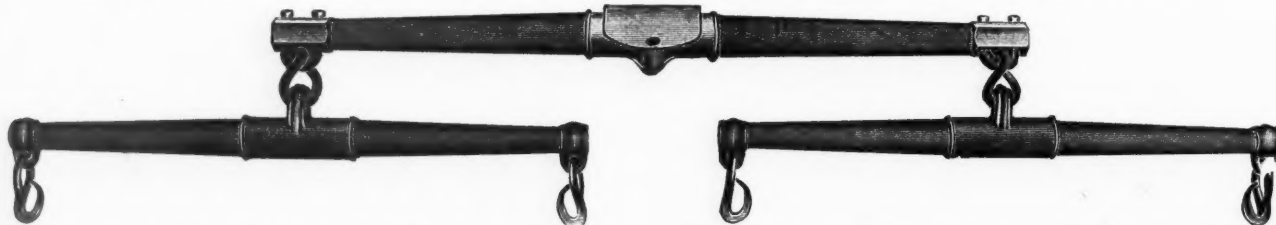
One of the most important parts of a meter is the intermediate train, which, in this meter, has stepped bearings, thus reducing friction and consequent wear, and resulting in greater sensibility. The different wheels are so proportioned in size and strength as to exactly meet their separate requirements, making a piece of mechanism in which every part is equal to its task, without any weak places.

The entire measuring chamber is completely surrounded, as well as filled with water at the same pressure, thus keeping the working parts in perfect equilibrium at all times. The measuring chamber is supported in the lower shell by lugs, making it possible to lift out this part instantly without having to remove a bolt or screw, after the upper shell has been taken off. This feature makes the meter very simple to assemble, or take apart, by anyone not familiar with its construction.

By addressing the Pittsburg Meter Company, Pittsburg, Pa., our readers can secure a copy of the finely illustrated catalogue recently issued by the company.

Tubular Steel Doubletrees

THE Tubular Steel Doubletrees illustrated below are most durable and are practically indestructible. They are made from steel tubes, tapered and flattened and equipped with all forged fittings. The tapering process gives them a symmetrical appearance, while the flattening operation adds materially to their strength as well as appearance. The doubletrees illustrated below are specially designed for use on wheel scrapers and dirt trucks, such as are manufactured by the Shadbolt Mfg. Co., of Brooklyn, N. Y., the Columbia Wagon Co., of Columbia, Pa., and any other style of dump wagon on the market. These doubletrees can be used also on wheel scrapers, as the center bearing has a broad, flat surface which prevents tilting, a trouble frequently complained of by those using wooden doubletrees. The style of hooks for trace attachment, shown here, is the kind most desired by contractors, but if rings or cockeye hooks are desired, the singletrees can be furnished that way. These goods are used extensively by hundreds of railroad contractors and the unanimous opinion of them all is that they are well worth the cost over wooden doubletrees.



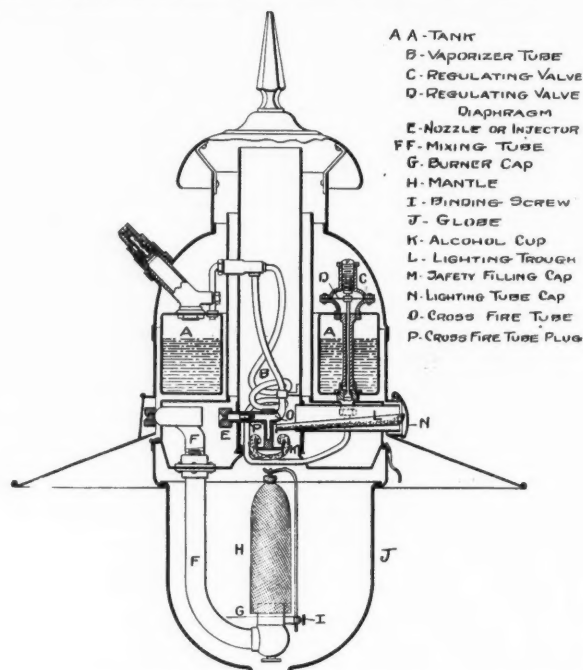
The manufacturers, The Pittsburgh Tubular Steel Whiffletree Company, Pittsburgh, Pa., have received the endorsement of thousands of contractors from all parts of the United States, Mexico and even Australia, who have been using these whiffletrees for years. The company asserts, as a guaranty, that one set of tubular steel doubletrees will outwear any six sets of wooden doubletrees ever constructed, and will cost less for repair parts.

The Automatic Outdoor Lamp

In the January issue reference was made to the Automatic Outdoor Lamp manufactured by the Automatic Incandescent Light Co., Northboro, Mass., and illustrated the work it is doing in that place.

A representative of the MUNICIPAL JOURNAL AND ENGINEER visited Northboro for the purpose of investigating the system personally, and was greatly surprised at the work it was doing.

The lamp as used in Northboro is what is known as the 1903 Model. The company has now on the market the 1904 Model, which is claimed to surpass anything ever seen in an outdoor lamp.



- A - TANK
- B - VAPORIZER TUBE
- C - REGULATING VALVE
- D - REGULATING VALVE
- E - DIAPHRAGM
- F - NOZZLE OR INJECTOR
- FF - MIXING TUBE
- G - BURNER CAP
- H - MANTLE
- I - BINDING SCREW
- J - GLOBE
- K - ALCOHOL CUP
- L - LIGHTING TROUGH
- M - SAFETY FILLING CAP
- N - LIGHTING TUBE CAP
- O - CROSS FIRE TUBE
- P - CROSS FIRE TUBE PLUG

It is so constructed that it is easier to light or extinguish than an ordinary hand lantern. The parts requiring cleaning or needling are so arranged that they are readily accessible, and the appliances furnished for doing this work in themselves are built on the automatic plan.

The accompanying illustration shows a diagram of the internal parts of the lamp, and also all of the necessary tools required to run any number of lamps.

The company has certainly reduced the matter of street lighting in either small towns or large cities to a very simple matter.

Eureka Fire Hose at Baltimore Fire

THAT some of the glory that has come to Chief Howe and the seven New York fire engine companies, who were sent by the Mayor of New York City to assist Baltimore in the recent great fire, rightly belongs to the hose used by them, will not be questioned. Chief Howe took about 10,000 feet of 2½-inch Eureka Fire Hose, which had just been delivered by the Eureka Fire Hose Company to the city of New York, under a contract aggregating 20,000 feet 2½-inch, 1,500 feet 3-inch, 4,500 feet 1½-inch, and 250 feet 4-inch fire hose.

Subsequently, on Feb. 7th, about 4 o'clock P. M., the Eureka Fire Hose Company received a telegraphic communication from the Honorable Robt. W. McLane, mayor of the city of Baltimore, to ship them as quickly as possible 20,000 feet 2½-inch fire hose, with Baltimore standard couplings attached complete. The Pennsylvania R. R. through General Manager Atterbury, offered every facility in the way of special trains, shipping the hose on regular passenger trains with-

out expense, in fact, was extremely courteous and anxious to do everything possible to expedite matters.

Notwithstanding the fact that couplings had to be threaded especially, the Eureka Fire Hose Company shipped, on the night of Feb. 8th, 4,000 feet, and ran its factory especially to do this work until 12 o'clock P. M. On the morning of the 9th the company shipped 3,500 feet; Feb. 11th, 5,500 feet, and Feb. 13th, 7,000 feet, practically completing the entire order within three days, and threading 400 sets of couplings to conform to Baltimore City Fire Department requirements. All this was done in the Eureka Fire Hose Works, at Jersey City, N. J.

Double-Track between Buffalo and Chicago

THE only double-track line between Buffalo and Chicago is the Lake Shore and Michigan Southern Railroad. In connection with the New York Central and the Boston & Albany railroads it forms the only double-track road between Chicago, New York and Boston. In addition to this it is the most interesting route between the East and the West, traversing, as it does, the richest and finest portion of the Middle States. Its freedom from curves and the excellence of its road-bed make it the most comfortable of routes. In the opinion of many who are experienced in travel, it has no superior in perfectness of road-bed, punctuality and elegance of service, and the comfort and care of passengers. It is also the route of the famous fast mail trains, the "20th Century Limited," and the "Lake Shore Limited."

Items of Interest to the Trade

—The Standard Water Meter Company, of Brooklyn, N. Y., reports that it has been advised of the acceptance of its bid for supplying meters for Philadelphia for the year. The business of the company is reported as increasing rapidly and an extensive plant for making all its brass castings is being installed.

—It is stated that the Builders' Iron Foundry, of Providence, R. I., will have charge of the sales of the pumping engines, compressors and blowing engines of the d'Auria Pumping Engine Company. The engines and compressors will be built in the shops of the Builders' Iron Foundry at Providence.

—The Eureka Fire Hose Company, New York, has arranged with Mr. Pearse to represent it exclusively in Colorado and Wyoming in the sale of its well-known brands of Eureka, Paragon and Red Cross fire hose. Mr. Pearse was chief of the Denver Fire Department for seventeen years.

—The Neptune Meter Company, Newark, N. J., have gotten out a neat blotter containing an extract from "Mr. Dooley on Prayers for Victory," with the comment that the struggle for existence is a fight, and the survival of the fittest results from victory in many fights. This success engenders reliance, and the success of the Trident meter in all fights has caused the greatest reliance to be placed upon it.

—The American Steel & Wire Company is installing its system of water purification by sulphate of iron at Elyria, O.

—The Jackson Filter Mfg. Company, St. Louis, has completed the installation of several large water filters at the Exposition grounds.

—E. S. Shoud & Co., of Chicago, have received a conditional order for 72 street sweeping machines from the city of Manila.

—The large plant of the Terre Haute Brick & Pipe Company, at Terre Haute, Ind., has been temporarily shut down pending some extensive enlargements and the installation of new machinery.

—The Contractors' Supply Company, Chicago, is putting out a new type of concrete and mortar mixer, designed especially for street work.

—The Ewing-Merkle Electric Company, of St. Louis, is making arrangements to entertain its friends during the coming Exposition. A clubhouse will probably be erected on the grounds where the company's guests will be cared for.

—The Hydraulic Pressed Brick Company, St. Louis, will remodel its general offices especially to entertain its friends during the Exposition. The architects will be invited to make the offices their headquarters, and a postal station will be established. An automobile will carry the guests to and from the grounds.

—The Commercial Railway Equipment Company, 120 Liberty street, New York, issues a monthly list of new and second-hand equipment for railroads, mines, power plants, contractors and others. Engines, crushers, steam shovels, boilers, etc., are to be had of this company, either new or second-hand. Contractors and others should ask to have the lists mailed them regularly.

—The American Process Company, of 62-64 William street, New York City, has just installed a direct heat sand dryer for the Granite Brick Company at Glens Falls, N. Y. They are manufacturers of brick under the Huennekes system. They have also just finished the installation of a clay dryer for the Chattahoochee Chemical & Mining Company, of Girard, Ala., as well as the completion of a direct heat dryer for Messrs. M. P. Hubbard & Co., Baltimore, Md., to dry sulphate of lime refuse.

—Power & Mining Machinery Company, 52 William street, New York, report a number of important installations of the American Crossley Gas Engine. Among these is one for the Elmira Water, Light & Railroad Company, Elmira, N. Y.; Milford Electric Light Company, Milford, N. H.; The Motor Engine Company, 15 William street, New York; The Amfaro Mining Company, Philadelphia, Pa.; Nogales Copper Company, of Chicago, for installation in their mines in Mexico; and the Sayles' Bleacheries, Saylesville, R. I.

Publications Received

—A finely illustrated catalogue has been issued by the United States Wood Preserving Company, 29 Broadway, New York, concerning "Modern Wood Pavements—A Record of Service," showing many different places where this creosinate wood paving has been laid and the success it has attained under widely different circumstances and conditions.

—The Blackmar & Post Pipe Company, of St. Louis, has issued a booklet showing the many advantages of vitrified pipe over brick sewers. Illustrations show several "handy tricks" in handling the pipes in laying that save labor. The methods and results of crushing and hydrostatic tests are also given.

—A catalogue of fifty-five pages with cover tells all the details of valves for steam, water, gas, oil, ammonia, etc., hydrants and general supplies for water plants manufactured by C. W. Thomas, successor to the Michigan Brass & Iron Works, Detroit, Mich.

—Most towns and isolated public institutions are considering the vital question of economical sanitary disposal of sewage. They will find the booklet just published by the N. O. Nelson Mfg. Company, St. Louis, Mo., on the Nelson Septic Sewage Disposal System of great interest, and they should write for a copy before the hot weather sets in.

—A full description of the Trident water meter is given in an illustrated booklet issued by the Neptune Water Meter Company, Newark, N. J. Diagrams show every portion of this disc meter, while the text discusses the question very completely.

Favors Board of Public Works for Erie

The police signal system of Erie, Pa., needs rebuilding, according to Mayor William Hardwick, and he recommended that a sufficient amount be provided for this purpose. He is of the opinion that all city improvements of a permanent nature should be paid for from bond issue, because the improvements benefit the future as well as the present generation and the former should bear a portion of the expense. No bonds should be issued, however, that would bring the borrowing powers of the city too near the legal limit, as a reasonable margin should at all times be preserved for extraordinary public necessity. He favors public commissions or boards for the conduct of city affairs and, therefore, recommended that a board of public works be created. Council should also create a grade-crossing commission to take charge of this important question.

CONTRACT NEWS FOR THE MONTH

Including Paving, Sewerage, Water Supply, Lighting, Public Buildings, Sewage and Garbage Disposal, Fire Supplies, Contracts Awarded

N. B.—All news of proposed work sent us by city officials is incorporated in our Weekly Advance News Service and appears subsequently in this "Contract News for the Month" if the date of the reception of bids be sufficiently late to warrant placing the item here.

City officials and others are urged to send us all news of contemplated improvements for use in our Weekly Bulletins which are mailed to those interested.

PAVING, PAVING MATERIALS AND MACHINERY

Akron, O.—An ordinance provided for the extension of Perkins street, to cost \$10,000.

Allentown, Pa.—\$20,000 has been appropriated for street intersections.

Amsterdam, N. Y.—Brick may be laid on Division street.

Anderson, Ind.—Bids are wanted March 7 for improving Nichol avenue. City Clerk.

Ashland, Wis.—Resolutions provide for the paving of two streets with macadam, three with asphalt, and one with macadam. City Engineer Dozer.

Athens, Ga.—Will lay 10,000 square yards of macadam. City Engineer Burnett.

Atlanta, Ga.—Three streets will be paved with asphalt.

Attleboro, Mass.—A State road may be laid from Norton Line to this place.

Battle Creek, Mich.—It is stated that Marshall street is to be paved.

Bay City, Mich.—Brick will be laid on Johnson street and Washington avenue.

Birmingham, Ala.—An ordinance provided for the paving of Third avenue.

Bloomfield, N. J.—Bids were to be asked for the opening, widening and grading of Ohio street. Town Clerk.

Bloomington, Ill.—Ordinances provide for the laying of asphalt and brick on various streets. City Engineer Folson.

Brownstown, Ind.—Bids are wanted March 7 for a gravel road. County Auditor Manuel.

Buffalo, N. Y.—It was stated that Laurel street might be extended.

Camden, N. J.—Two streets will be asphalted.

Chicago, Ill.—Halstead street will be paved with granite at a cost of \$57,000.

Collingswood, N. J.—A vote is to be taken on street improvements. Mayor Collins.

Collinwood, O.—Bids were to be asked soon for improving Collamer street. City Auditor C. J. Moses.

Covington, Ky.—Will have about \$90,000 for the purpose of laying brick and creosoted wood block paving. City Engineer Gunn.

Danville, Ill.—An ordinance provided for the grading, paving, etc., of Park avenue at a cost of \$8,383.

Davenport, Ia.—Various streets are to be paved.

Dayton, O.—Ridge avenue is to be improved.

Defiance, O.—Various streets are to be improved according to reports.

Detroit, Mich.—All bids for the municipal brick making plant were rejected. Commissioner W. H. Maybury, Public Works.

Dubuque, Ia.—Plans have been improved for the improvement of Wisconsin avenue.

Duluth, Minn.—Estimated cost of wood pavement on two streets placed at \$135,000.

Easthampton, Mass.—The estimated cost of macadam on Main street was placed at \$6,000.

Fitchburg, Mass.—It is said that about 4,000 square yards of granite block is to be laid on various streets this season. City Engineer Hartwell.

Flint, Mich.—Resolution called for the paving of two streets.

Fort Wayne, Ind.—A gravel road may be constructed. County Auditor Burget.

Freeport, Ill.—Stephenson street will be macadamized.

Geneva, N. Y.—Bids are wanted March 3 for brick, macadam, or asphalt paving. W. S. Wood, Secretary Board of Public Works.

Gloucester, Mass.—Have appropriated for granite block on Rogers street \$20,000. City Engineer Webber.

Grand Rapids, Mich.—Block asphalt may be laid on North College avenue. West Fulton street will be paved with brick at cost of \$19,780. Martha street will be graded and graveled and Canal street paved with brick on concrete.

Green Bay, Wis.—Various streets may be paved.

Guadalupe y Calvo, Mexico.—It was stated that a \$65,000 wagon road would be built between this place and Parral. Tiburcio Garcia, Jefe Politico.

Hamilton, O.—Resolutions provided for the paving of nine streets.

Harrisburg, Pa.—City Engineer Cowden has completed plans for paving of nine alleys. Discussing the paving of twenty-four avenues. Hartford, Conn.—Considering the macadamizing of Vine street at a cost of \$7,000.

Hoboken, N. J.—Plans have been made for a new parkway.

Houghton, Mich.—Plans have been made for asphaltizing Quincy street.

Indianapolis, Ind.—North West street will be paved with asphalt. Board of Public Works.

Jackson, Mich.—Two streets will be paved.

Kalamazoo, Mich.—Plans have been made for the paving of three streets.

Kansas City, Mo.—Walnut street is to be resurfaced.

Kingston, N. Y.—It is said that \$54,000 road improvements bonds have been issued.

La Crosse, Wis.—Brick and macadam paving are under consideration.

La Vegas, N. M.—Two streets are to be graded and bids are to be asked.

Lawrence, Kan.—Bids are wanted March 7 for the grading, paving and curbing of Lee street.

Lawrence, Mass.—May spend \$86,000 for street paving, etc.

Lexington, Ky.—Mayor T. A. Combs wrote that several thousand paving brick and several carloads of paving pitch was wanted.

Litchfield, Ill.—\$10,000 was appropriated for street improvements.

Lima, O.—Four streets will be paved.

Logansport, Ind.—New bids were to be asked for a gravel road in Deer Creek Township.

Los Angeles, Cal.—Hill street is to be paved according to reports.

Louisville, Ky.—Reports stated that the Eastern and Western Parkway boulevard would cost \$200,000. Board of Park Commissioners.

Manchester, Va.—May spend \$10,000 on street improvements.

Manistee, Mich.—Various streets may be macadamized.

Marion, Ind.—Two miles of gravel road have been petitioned for.

Masillon, O.—East street will be paved.

Mexico, Mo.—Nine blocks are to be paved with brick or block paving.

Moline, Ill.—It is said that about fifty blocks of paving, mostly asphalt, are to be laid.

Montgomery, Ala.—An ordinance provided for the laying of walks on High street. South McDonough street will probably be graveled.

Muncie, Ind.—Bids are wanted March 1 for grading and crushed stone paving on Jackson street. Town Clerk Mitchell.

New Orleans, La.—Various streets are to be asphalted.

Oakland, Cal.—It is said that Thirty-ninth street will be macadamized.

Ogden, Utah.—Twenty-fifth street will be asphalted.

Omaha, Neb.—Ordinances provided for the paving and curbing of Railroad avenue.

Pasadena, Cal.—Two streets will be paved with asphalt at a cost of \$180,000. City Engineer J. D. Allin.

Pawtucket, R. I.—It is said that \$250,000 bonds for highway work will be issued.

Peoria, Ill.—Brick may be laid on New York avenue.

Pittsburg, Pa.—\$400,000 was appropriated for the Bureau of Highways and Sewers, and \$70,000 for the Bureau of Construction.

Pomona, Cal.—Considering extensive street improvements.

Portsmouth, O.—Bids are wanted March 8 for brick on four streets. R. A. Bryan, Engineer.

St. Augustine, Fla.—A \$50,000 road from Jacksonville to Dayton has been proposed.

St. Paul, Minn.—West Seventh street will be macadamized at cost of \$24,000.

San Diego, Cal.—Will ask new bids for grading Columbia street.

San Jose, Cal.—New avenue will be extended.

Sherman, Tex.—Several blocks of Travis street may be paved.

Southampton, N. Y.—\$35,000 appropriation was made for macadam work, curbing, etc. F. A. Dunham, Engineer, 109 Park avenue, Plainfield, N. J.

Springfield, Mo.—Campbell street will be paved. City Clerk Houston.

Springfield, O.—Estimated cost of brick paving on Lagonda avenue placed at \$80,000; and for asphalt on High street, \$35,000. City Engineer Sieverling.

Steubenville, O.—Bids are wanted March 10 for constructing a turnpike road. R. S. Neel, Chairman Road Commissioners.

Superior, Wis.—Twenty-first street will probably be paved soon. Bids were to be asked for brick paving on Ellsworth street. Board of Public Works.

Tacoma, Wash.—Bids were to be asked for the paving of Pacific street at estimated cost of \$52,000. City Engineer Nicholson.

Titusville, Pa.—Bids are wanted March 7 for paving Spruce street with brick at cost of \$30,900. City Clerk Dame.

Toronto, Ont.—Estimated cost of paving Esplanade street placed at \$101,370.

Utica, N. Y.—Bids are wanted in April for paving work to cost \$135,000. City Clerk Cantwell.

Versailles, Ind.—Considering the construction of gravel roads in Ripley County at cost of \$48,061.

Warren, Mich.—Have sold \$35,000 bonds for six miles of stone roads.

Washington, Ia.—Resolution provided for the laying of eighteen blocks of brick paving this season.

Washington, D. C.—Shepherd street will be extended.

Wilkes-Barre, Pa.—Mayor Price recommended the laying of brick to replace cobblestones.

Wilmington, Del.—Eighteenth street will be improved.

Woonsocket, R. I.—Considering the paving of Main street at a cost of \$45,000. City Engineer Mills.

Youngstown, O.—Wilson avenue may be paved with asphalt at a cost of \$20,000. Ordinance provided for the paving of Himrod avenue.

CONTRACTS AWARDED

Aida, O.—E. H. Freswater & Sons received contract for paving Main street at \$48,969.

Atchison, Kan.—S. M. Messimer & Co. have paving contract for \$12,827.

Belleville, Ill.—Stokey & Reel have contract for paving Illinois street with Western brick at \$20,024. Hoeffken Bros. have contract for paving West Main street at \$46,256 for Purington brick and \$5,435 for Indiana Bedford stone curb.

Buffalo, N. Y.—Barber Asphalt Co. was low bidder for repaving Crescent avenue at \$11,957. German Rock Asphalt Co. received contract for repaving Fifteenth street at \$7,828.

(Continued on page 26.)

THE BEST MUNICIPAL BOOKS

Roads and Pavements.

HIGHWAY CONSTRUCTION. Treatise on construction and maintenance of roads, streets and pavements. A. T. Byrne. 895 pp., illus. \$5.00. w.

TEXT-BOOK ON ROADS AND PAVEMENTS. Country roads and city streets. F. P. Spalding. 213 pp., illus. \$2.00. w.

STREET PAVEMENTS AND PAVING MATERIALS. Methods and materials of city street construction. George W. Tillson. 496 pp., illus. \$4.00. Postage 19c. w.

ROADS AND PAVEMENTS. Paving materials and pavement construction. Ira Osborn Baker. 600 pp. Illus. \$5.00. Postage 21c. w.

CITY ROADS AND PAVEMENTS. William Pierson Judson. 186 pp., illus. \$2.00. Postage 12c. e.

ROADS: THEIR CONSTRUCTION AND MAINTENANCE. Special reference to road materials. Allen Greenwell and J. V. Elsdon. (English.) 280 pp., illus. \$1.50. Postage 9c. wh.

ECONOMICS OF ROAD CONSTRUCTION. A short practical treatise. Herbert P. Gillette. 41 pp., illus. \$1.00. e.

PRACTICAL TREATISE ON THE CONSTRUCTION OF ROADS, STREETS AND PAVEMENTS. Gen. Q. A. Gilmore. Illus. \$2.00. v.

NEW ROADS AND ROAD LAWS IN THE UNITED STATES. Gen. Roy Stone. Illus. \$1.00. v.

Miscellaneous.

MUNICIPAL IMPROVEMENTS. Manual of the methods, utility and cost of public improvements. W. F. Goodhue. 207 pp., illus. \$1.75. w.

ECONOMIC DISPOSAL OF TOWNS' REFUSE. W. F. Goodrich. (English.) 340 pp., illus. \$3.50. Postage 16c. w.

AMERICAN MUNICIPAL PROGRESS. Chapters in municipal sociology. Charles Zueblin. 380 pp. \$1.25 net. mc.

THE PUBLIC SCHOOL SYSTEM OF THE UNITED STATES. Dr. J. M. Rice. 307 pp. 1.50. c.

THE IMPROVEMENT OF TOWNS AND CITIES. Practical basis of civic æsthetics. Charles Mulford Robinson. 309 pp. \$1.25 net. Postage 9c. p.

THEORY AND PRACTICE OF TAXATION. David A. Wells, LL.D. 650 pp. \$2.00. Postage 14c. a.

MUNICIPAL MONOPOLIES. A collection of papers by American economists and specialists. Edward W. Bemis, Ph.D. 680 pp. \$2.00. Postage 14c. tc.

MONOPOLIES PAST AND PRESENT. A study of monopolies and the problems connected with those of the present. James E. Le Rossignol, Ph.D. 253 pp. \$1.25. tc.

MUNICIPAL PUBLIC WORKS. Their inception, construction and management. S. Whinery, C.E. 341 pp. \$1.50. Postage 13c. mc.

STEAM POWER PLANTS: THEIR DESIGN AND CONSTRUCTION. Henry C. Meyer, Jr. 159 pp., illus. \$2.00. Postage 12c. m.

SURVEYING. A general hand-book for field and office. John Whitelaw, Jr. (English.) 506 pp., illus. \$4.00 net. Postage 21c. v.

MUNICIPAL GOVERNMENT IN CONTINENTAL EUROPE. Albert Shaw. 491 pp. \$2.00. Postage 18c. c.

MUNICIPAL GOVERNMENT IN GREAT BRITAIN. Albert Shaw. 375 pp. \$2.00. Postage 15c. c.

PORTLAND CEMENT. Its manufacture and use. Charles D. Jameson. \$1.50. v.

AMERICANS IN PROGRESS. A story of settlement work in Boston. Robert A. Woods. 383 pp. \$1.50 net. Postage 13c. h.

FACTS ON FIRE PREVENTION. The result of tests by British Fire Prevention Committee. Edwin O. Sachs. (English.) 2 vols., 226 pp. each. Illus. \$10. Postage 20c. per vol. sr.

MUNICIPAL JOURNAL PUBLISHING COMPANY,
253 BROADWAY, NEW YORK.

Decatur, Ind.—Fred Hoffman has contract for macadamizing Thirteenth street at \$4,515.

Eric, Pa.—P. J. Wissler received contract for Medina stone on State street at 54 cents per square yard.

Everett, Mass.—T. Stewart & Co., Newton, has contract for the extension of State Boulevard.

Flint, Mich.—Timothy Lynch has contract for paving First and Third streets with Nelsonville brick at \$5,825.

Grand Rapids, Mich.—C. F. Patton received contract for paving Front street at \$14,000.

Holley Beach, N. J.—Banks and Martinet have contract for cement walks and curbs at \$14,000.

Jackson, Wis.—It is reported that Miller Paving Company, Memphis, Tenn., has contract for concrete paving here.

LeMars, Ia.—Snouffer & Ford, Cedar Rapids, has contract for paving three streets with Puritan block at \$2.02 per square yard.

Louisville, Ky.—Selvage Construction Co. and L. R. Figg have contract for reconstructing six streets at \$60,000.

Marion, Ind.—Nathan P. Medlin has contract for two gravel roads at \$9,999.

Maywood, N. J.—Colfax & Steele, Pompton, have contract for four miles of macadam at \$16,465.

Ottawa, O.—C. W. Ryan, Maumee, has contract for seven miles of stone road.

Peoria, Ill.—Ordinance provided for resurfacing of Moss avenue. M. E. Case has contract for brick paving on Washington avenue at \$16,000.

Perth Amboy, N. J.—J. J. Harkins has contract for brick paving on Washington street at \$1.91 per square yard.

Richmond, Ind.—Miller & Schneider have contract for reducing grade of Burgess Hill at \$5,000.

Rochester, N. Y.—Whitmore, Rauber & Vicinus have contract for asphalt repairs for 1904 at \$16,680. Contract for paving Commercial street let George W. Hagaman for Medina block at \$15,783.

Rushville, Ind.—Philip Wilk has contract for macadamizing three miles of pike.

St. Paul, Minn.—L. G. Washington has contract for cement and stone walks for 1904.

San Diego, Cal.—J. Engelbret received contract for grading Brooks avenue.

Somerset, Ky.—Conley Bros., Danville, have contract for paving at \$15,000.

Spokane, Wash.—G. E. Stone & Co. were low bidders for grading, paving and curbing Ash street, at \$4,200.

Superior, Wis.—Magnus Peterson & Co. were low bidders for macadam on Twelfth street.

Upper Sandusky, O.—Gaudert Bros., Mansfield, were low bidders for paving two streets at \$16,000.

Warrensburg, Mo.—Contract let E. E. Strickland for paving three streets at 58 cents per square yard and 40 cents for curbing.

LIGHTING

Albany, N. Y.—60,000-light plant may be installed in the capitol and State House.

Anadako, O. T.—Will vote on \$30,000 bond issue for light plant and water works.

Anniston, Ala.—A. H. Quinn asked franchise for electric and power plant.

Atlanta, Ga.—Twenty-three new arc lights were to have been put in.

Attala, Ga.—Voted \$20,000 bonds to buy light plant and water works.

Beaver, Pa.—An electric light plant may be put in.

Belzona, Miss.—Bids are wanted March 1 for electric light plant and water works. Mayor Castleman.

Birmingham, Ala.—A \$15,000 light plant has been proposed for the West End. Mayor Norwood.

Burlington, Wis.—Municipal electric light plant has been proposed. Chairman J. P. Gill, Light and Water Commissioner.

(Continued on page 27.)

THE BEST MUNICIPAL BOOKS

Sewers and Sewage

SEWAGE AND BACTERIAL PURIFICATION OF SEWAGE. Methods of disposal, etc. Samuel Rideal, D.Sc. (English.) 278 pp. \$3.50. Postage 13c. w.

SEWERAGE. Design, construction and maintenance of sewer systems. A. Prescott Folwell. 445 pp., illus. \$3.00. Postage 17c. w.

SEWAGE DISPOSAL. Methods of disposal and purification. Wyncoop Kiersted. 182 pp. \$1.25. w.

SEWER DESIGN. Treatise on sewer construction. H. N. Ogden. 234 pp., illus. \$2.00. w.

SEWERS AND DRAINS FOR POPULOUS DISTRICTS. Rules and formulas for dimensions and construction. J. W. Adams. \$2.50. v.

PURIFICATION OF SEWAGE. Scientific principles of sewage purification and their application. Sidney Barwise. (English.) Illus. \$2.00. v.

BACTERIAL PURIFICATION OF SEWAGE. Modern biological methods of purification. Sidney Barwise. (English.) Illus. \$2.50 net. Postage 11c. v.

CLEANING AND SEWERAGE OF CITIES. Translated from the German. R. Baumeister. Illus. \$2.00. v.

SEWAGE WORKS ANALYSES. Methods of analysis used in laboratory of Manchester Sewage Works, England. Gilbert J. Fowler. 128 pp., illus. \$2.00 net. Postage 6c. w.

MODERN TREATMENT OF SEWAGE. Principles for design of sewers and purification of sewage. (English.) H. C. H. Shenton. 117 pp. \$1.00.

PURIFICATION OF SEWAGE AND WATER. W. J. Dibdin. (English.) 3d Edition. Illus. 379 pp. \$6.50. Postage 18c. v.

SEWAGE DISPOSAL IN THE UNITED STATES. G. W. Rafters and M. N. Baker. Illus. \$6.00. v.

SEWAGE TREATMENT, PURIFICATION AND UTILIZATION. J. W. Slater. (English.) \$2.25. v.

SEPARATE SYSTEM OF SEWERAGE. Theory and construction. Cady Staley and G. S. Pierson. Illus. \$3.00. v.

SEWERAGE AND LAND DRAINAGE. Geo. E. Waring, Jr. Illus. \$6.00. v.

MODERN METHODS OF SEWAGE DISPOSAL FOR TOWNS, PUBLIC INSTITUTIONS AND HOUSES. Geo. E. Waring, Jr. Illus., 260 pp. \$2.00. v.

SEWERAGE AND SEWAGE PURIFICATION. M. N. Baker. 50 cents. v.

THE TREATMENT OF SEWAGE. Dr. C. Meynott Tidy. 50 cents. v.

ELEMENTS OF SANITARY ENGINEERING. Mansfield Merriman. 222 pp. \$2.00. w.

Lighting

ELECTRIC LIGHTING. Treatise on installation and operation of electric plants. F. B. Crocker. 2 vols., illus. \$3.00 each. Postage 23c. per vol. v.

FINANCES OF GAS AND ELECTRICITY MANUFACTURING ENTERPRISES. How to run plants successfully. William D. Marks. 120 pp. \$1.00. Postage 5c.

ELECTRIC LIGHT PLANTS. Their cost and operation. Buckley. \$1. ftw.

ART OF ILLUMINATION. How to properly distribute artificial light. Louis Bell, Ph.D. 350 pp., illus. \$2.50. Postage 20c. m.

Miscellaneous

DISINFECTION AND DISINFECTANTS. A practical guide for sanitarians, health and quarantine officers in stamping out infection. M. J. Rosenau, M.D. 345 pp., illus. \$2.00 net. Postage 15c. b.

HAND BOOK ON SANITATION. Manual on theoretical and practical sanitation. George M. Price. (English.) 306 pp., illus. \$1.50 net. Postage 10c. w.

PRACTICAL TREATISE ON THE EXAMINATION OF MILK, CREAM, BUTTER, ETC. J. A. Wanklyn. \$1.00. v.

MUNICIPAL JOURNAL PUBLISHING COMPANY,
253 BROADWAY, NEW YORK.

Chillicothe, O.—An electric plant may be installed. W. H. Sipple.
 Clinton, Miss.—Voted \$10,000 bonds for light plant and water works. The Mayor.
 Coatesville, Pa.—Talking of a village electric light plant.
 Coehran, Ga.—Will vote on bonds for electric light plant. The Mayor.
 Columbia, S. C.—It is said that a municipal electric plant will be put in. Chairman Cole Lighting Commissioner.
 Concord, N. C.—Talking of an electric light plant. City Clerk Fink.
 Creston, Ia.—Considering an electric light or gas plant.
 Dardanelle, Ark.—Contemplating an electric light plant. The Mayor.
 Delaware City, Del.—The town may have an electric light or gas plant. Mayor Smith.
 Eaton Rapids, Mich.—It is said that a municipal light plant to cost \$12,000 will be installed. City Recorder H. S. Bentley.
 Eau Claire, Wis.—Considering a municipal light plant.
 Ecorse, Mich.—The question of lighting has been considered.
 Ellensburg, Wash.—Voted to issue \$20,000 bonds for electric light plant.
 Fillmore, Utah.—Considering electric light plant.
 Flint, Mich.—Considering an electric light plant for 150 arcs. City Engineer.
 Glasgow, Mont.—An electric light plant will be installed.
 Glastonbury, Conn.—Discussing electric power plant.
 Greenwood, Wis.—Considering gas or electric light plant.
 Grove City, Pa.—Will probably construct municipal electric light plant. Borough Clerk Russell.
 Hannibal, Mo.—Voted \$100,000 bonds for improving light plant. Superintendent Nippur.
 Horseheads, N. Y.—Considering electric lighting.
 Joplin, Mo.—Will vote on \$30,000 bond issue to improve city lighting plant.
 Koochiching, Minn.—Bids were to be asked for municipal light plant.
 Merrimac, Mass.—Voted to issue \$95,000 bonds for light and water plant.
 Monticello, Wis.—May install municipal lighting plant. E. L. Babler.
 Napoleon, O.—Will vote on \$25,000 bond issue, part to be used to improve electric light plant.
 New Freedom, Pa.—Bids are to be asked for electric light plant and water works.
 New Haven, Ind.—May have municipal electric light plant.
 Newport, Ky.—City contemplating electric light plant. City Engineer Morlidge.
 Oconomowoc, Wis.—Will ask bids for improving the light plant.
 Orangeville, Utah.—Considering a joint electric light plant with Castledale. J. B. Crawford.
 Penn Yan, N. Y.—May vote in March on municipal electric light plant. Village President Underwood.
 Philadelphia, N. Y.—May spend \$12,000 for village electric light plant.
 Port Angeles, Wash.—A new light plant to cost \$6,000 favored.
 Rapid River, Mich.—An electric light plant may be installed.
 Reading, Pa.—May vote on issue of \$200,000 bonds for electric plant.
 Santa Rosa, Cal.—Will vote on bonds issue for municipal light plant.
 Shawano, Wis.—Issued \$11,000 electric light and water bonds.
 Sioux City, Ia.—May spend \$24,000 for improvements to light plant.
 South Norridgewock, Me.—It is said that the city will make contract for electric lighting.
 Tipton, Ind.—May enlarge the municipal electric light plant.
 Troy, O.—An electric light plant may be built.
 Valotie, N. Y.—Talking of a municipal electric light plant. Village President Lasher.

(Continued on page 28.)

THE BEST MUNICIPAL BOOKS

Water Supply.

- WATER-SUPPLY.** Considered from a sanitary standpoint. Wm. P. Mason. 500 pp., illus. \$4.00. Postage 18c. w.
- EXAMINATION OF WATER.** Chemical and bacteriological. Wm. P. Mason. 131 pp. \$1.25. Postage 8c. w.
- WATER-SUPPLY.** Mainly from a chemical and sanitary standpoint. Wm. Ripley Nichols. 232 pp. \$2.50. w.
- PUBLIC WATER-SUPPLIES.** Requirements, resources and construction of works. F. E. Turneure and H. L. Russell; with a chapter on pumping machinery by D. W. Mead. 733 pp., illus. \$5.00. Postage 24c. w.
- MICROSCOPY OF DRINKING WATER.** Methods of examination of and organisms found in water. George C. Whipple. 338 pp., illus. \$3.50. w.
- WATER-SUPPLY ENGINEERING.** Design, construction and maintenance of water-supply systems, both city and irrigation. A. Prescott Folwell. 562 pp., illus. \$4.00. w.
- WATER POWER.** Outline of the development and application of the energy of flowing water. Joseph P. Frizell. 589 pp., illus. \$5.00. w.
- WATER FILTRATION WORKS.** Purification of water by slow and rapid filtration and the design of works. James H. Fuertes. 283 pp., illus. \$2.50. Postage 10c. w.
- FILTRATION OF PUBLIC WATER-SUPPLY.** Construction and operation of rapid and slow filters and treatment of waters. Allen Hazen. 321 pp., illus. \$3.00. w.
- TOWERS AND TANKS FOR WATER-WORKS.** Theory and practice of their design and construction. J. N. Hazlehurst. 216 pp., illus. \$2.50. Postage 12c. w.
- DESIGN AND CONSTRUCTION OF DAMS.** Includes masonry, earth, rock-fill and timber, and the principal types of movable dams. Edward Wegmann. 250 pp., illus. \$5.00. w.
- WATER AND WATER-SUPPLIES.** A general work including purification, distribution, etc., of water-supplies. John C. Thresh. (English.) 500 pp., illus. \$2.00 net. Postage 13c. b.
- WATER AND PUBLIC HEALTH.** The relative purity of waters from different sources. James H. Fuertes. \$1.50. w.
- TREATISE ON HYDRAULIC AND WATER-SUPPLY ENGINEERING.** Practical construction of waterworks in America. J. T. Fanning. Illus., 650 pp. \$5.00. v.
- PURIFICATION OF PUBLIC WATER SUPPLIES.** John W. Hill. 304 pp., illus. \$3.00. v.
- REPORT ON THE FILTRATION OF RIVER WATERS FOR THE SUPPLY OF CITIES IN EUROPE.** James P. Kirkwood. Illus. \$7.50. v.
- WATER-WORKS DISTRIBUTION.** A guide to the laying out of distribution mains for cities and towns. J. A. McPherson. Illus. \$2.50. v.
- WATER ANALYSIS.** Treatise on the examination of potable water. J. A. Wanklyn. \$5.00. v.
- DESIGN AND CONSTRUCTION OF STORAGE RESERVOIRS.** Arthur Jacob. 50 cents. v.
- WATER AND WATER SUPPLY.** W. H. Corfield. (English.) 50 cents. v.
- POTABLE WATER AND METHODS OF DETECTING IMPURITIES.** M. N. Baker. 50 cents. v.
- FLOW OF WATER IN OPEN CHANNELS, PIPES, SEWERS, ETC.** (With tables.) P. J. Flynn. 50 cents. v.
- WATER WORKS FOR SMALL CITIES AND TOWNS.** John Goodell. 281 pp., illus. \$2.00. m.
- SOME DETAILS OF WATER WORKS CONSTRUCTION.** W. R. Billings. 96 pp., illus. \$2.00. m.
- WATER WASTE PREVENTION.** Its importance and the evils due to its neglect. Henry C. Meyer. \$1.00. m.
- RESERVOIRS FOR IRRIGATION, WATER-POWER, AND DOMESTIC WATER SUPPLY.** Also an account of various kinds of dams and their construction. James D. Schuyler. 432 pp., illus. \$5.00. w.

MUNICIPAL JOURNAL PUBLISHING COMPANY,
 253 BROADWAY, NEW YORK.

Waco, Tex.—Will issue bonds for an electric light plant according to reports.

Waddington, N. Y.—It was voted to sell the municipal electric light plant.

Walnut, Ia.—Plans accepted for \$14,000 electric light plant.

Watkins, N. Y.—Talking of a municipal electric light plant.

Weehawken, N. J.—May have a municipal electric light plant. Mayor Bergen.

Williamsburg, Va.—It was said that the Council would buy lamps and do its own lighting. Mayor Mercer.

Webster, S. D.—About \$2,000 will be spent in improving the electric plant.

Williamsport, Pa.—Bids for five years' lighting will be asked. Light and Water Com.

Yankton, S. D.—Considering purchase of a lighting plant or the erection of a new one. City Clerk Russell.

CONTRACTS AWARDED

Asbury Park, N. J.—A. D. Granger Co., New York, has contract for electric light plant at \$10,773.

Benton Harbor, Mich.—Contract for street lights let B. H. Electric Light Co. at \$47 each for 115 1,200 candle-power arcs.

Columbus, Ind.—General Electric Co., Schenectady, N. Y., has contract for electric light plant at \$7,033.

Negaunee, Mich.—Central Construction Co., Oshkosh, Wis., has contract for \$15,000 improvements to electric light plant.

New Prague, Minn.—G. Hoffman has contract for electric power plant.

Newtown, Pa.—Stated that the O. Electric Railway Co. has contract for street lighting.

Omaha, Neb.—Welsbach Street Lighting Co. has contract for two years for lighting 250 lamps at \$28 per year.

Sandersville, Ga.—J. H. McKenzie & Son, Augusta, has contract for waterworks and electric light plant at \$5,000.

Washington, D. C.—Piedmont Electric Co. has contract for electric light plant for Cherokee Indian School, N. C., at \$2,472.

Waterville, Wash.—G. H. Gray & Son, Ential, have contract for fifteen years for light and power at \$50 per horse-power per year.

Winston-Salem, N. C.—Fries Mfg. & Power Co. has contract for thirteen years for lighting at \$60 per light per year.

WATER SUPPLY

Aberdeen, Miss.—Will issue bonds for water works.

Adams, Ore.—Have issued \$7,000 water bonds.

Alpena, Mich.—Will vote on \$150,000 water bond issue.

Altoona, Pa.—Considering plans for 6,000,000-gallon high-pressure reservoir. C. W. Knight, Engineer.

Ashland, Va.—Reports state that a water system is under consideration. Mayor Scott.

Assumption, Ill.—A new water supply may be installed.

Atlantic City, N. J.—Bids are wanted about March 8 for 300 feet of 12-inch submerged main. Superintendent Kenneth Allen.

Baumont, Tex.—Proposition for a water plant made by J. C. Bates, Worcester, Mass.

Beverly, Mass.—Water Department recommended new 12-inch mains.

Binghamton, N. Y.—Have been considering new 19,000,000-gallon pumping engine for water works. Superintendent John Anderson.

Bronson, Mich.—A vote will be taken in March on water works.

Burlington, Wis.—It is proposed to make 1,000-foot extension to the 8-inch water mains. Chairman Gill, Water and Light Commissioners.

Camden, N. J.—May issue \$200,000 bonds for duplicate pipe—20,000 feet—and for additional wells. Water Department.

Cannon Falls, Minn.—Considering extensions to the water systems.

Chattanooga, Tenn.—Bids are wanted March 10 for a pumping plant, etc., at Chickamauga Park, Ga. H. W. French, Q. M.

Cincinnati, O.—Will probably spend \$1,000,000 for new mains.

Clinton, Miss.—Voted \$10,000 bonds for water and light plant. The Mayor.

(Continued on page 29.)

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Columbus, O.—Water Works Com. recommended \$550,000 for building the Scioto Dam. Hope to start work on same by May. Mayor Jeffrey.

Corning, N. Y.—Water works extension will cost \$10,000. City Engineer Canfield.

Durant, I. T.—Bids are wanted March 2 for a standpipe and water-works system. Mayor Poole.

East Greenwich, R. I.—Considering water-works system.

El Dorado, Ark.—Contemplate the installation of \$30,000 water works. The Mayor.

Ellicott City, Md.—Discussing city water works.

Evanston, Ill.—Considering the construction of a storage reservoir. Commissioner Moore, Public Works.

Fall River, Mass.—Will make \$20,000 extensions to water works.

Fernandina, Fla.—A 500,000-gallon reservoir may be constructed.

Ft. Missoula, Mont.—Bids are wanted March 5 for pumphouse and equipment. J. McHyde, Q. M., St. Paul, Minn.

Galveston, Tex.—May have a new pipe line across bay. Supt. W. W. A. S. Drewry.

Genesee, Idaho.—Bids are wanted March 4 for water works, etc. City Clerk Burr.

Gorham, N. H.—The question of water works has been discussed.

Great Falls, Mont. Will probably install water meters.

Greenfield, Mass.—Will construct a new reservoir. Water Commissioners.

Hampton, Neb.—Water works to cost \$3,500 have been proposed.

Harrisburg, Pa.—It is said that water meters will probably be installed.

Harrisonville, Mo.—A vote is to be taken on water works and sewer system. City Clerk Roy Webber.

Havre, Mont.—Will have \$30,000 water works.

Hempstead, N. Y.—Considering \$12,000 extension of municipal works. Village Trustees.

Hudson, N. Y.—The water supply system may be remodeled.

Jersey City, N. J.—It is said that plans are filed for water mains to cost \$190,000.

Kalispell, Mont.—May purchase water plant or build new one.

Kansas City, Mo.—A new \$75,000 engine will be purchased for the Quindaro water station.

Lawrence, Mass.—Plans have been prepared for new filter bed. City Engineer Marble.

Laurel, Miss.—Water works will be extended at a cost of \$14,000. City Clerk Moore.

Lestershire, N. Y.—It is proposed to extend the water system.

Lincoln, Neb.—May construct a 1,000,000-gallon reservoir. City Engineer.

Lincolnton, N. C.—A vote is to be taken on bond issue for water works.

Los Angeles, Cal.—A \$150,000 reservoir may be constructed.

Lynchburg, W. Va.—Bids are wanted for filtration system, pumping station, etc. City Engineer Shaner.

Magnolia, Miss.—\$25,000 water works bonds have been issued.

Mankato, Minn.—Talking of an auxiliary system to cost \$5,200. May lay one mile of main. City Engineer Thompson.

Merrimac, Mass.—Voted to issue \$80,000 bonds for new water works.

Milton, N. H.—Talking of a system of water works.

Murray, O.—\$11,000 water works have been proposed. Mayor Hudson.

Nantucket, Mass.—Will vote on bonds for water works in March. Works for Siasconset.

Nevada, Mo.—Plans will be prepared for improvements to water works. City Engineer Clack.

Norfolk, Va.—Will install a new water main. Meters were defeated.

North Andover, Mass.—The water system will be extended.

Oak Bridge, La.—Water works are contemplated. Town Clerk Mills.

(Continued on page 30.)

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ments of all kinds. I assist in paving litigation, preparing cases and
expert witness. Asphalt Maps furnished free.

Ogden, Utah.—The Water Co. may extend its mains and make other improvements.

Orange, N. J.—Will engage an engineer to plan for increased water supply.

Osceola, Ia.—Bids are wanted March 8 for water works. City Clerk Temple.

Oswego, N. Y.—Preparing plans for water supply from the Lake.

Pawtucket, R. I.—Will issue \$125,000 bonds for water works extension and pumping station.

Port Townsend, Wash.—Will take a vote on the question of water works.

Plattsville, N. Y.—Water forks will be put in next summer.

Providence, R. I.—Bids are wanted March 1 for 25,000,000-gallon pumping plant. Commissioner of Public Works Slade.

Reno, Tex.—Water system will be improved and extended.

Schenectady, N. Y.—Bonds will be issued in the sum of \$11,000 for new mains.

Seattle, Wash.—Plans have been made for new standpipe to cost \$22,000.

Skidmore, Mo.—The question of water works has been under consideration.

South Framingham, Mass.—Considering a water supply and sewer system.

Strasburg, Va.—A water works system to cost \$10,000 will be installed. The Mayor.

Tampa, Fla.—The pipe system will be extended four miles this season.

Taunton, Mass.—May issue \$15,000 bonds for new mains and meters.

Tiffin, O.—May have a municipal plant if the water company does not come to terms.

Toronto, Ont.—About \$1,000,000 will be required to improve the water works.

Waldron, Ind.—There has been talk of putting in water works.

Waukesha, Wis.—A municipal water supply has been under consideration.

Wilmington, Del.—Considering enlargement of the water system.

Winsoski, Vt.—Water supply is being considered. Village Clerk Conlin.

Winthrop, Mass.—Will vote on municipal works in March.

Wolcott, N. Y.—Water works being considered. E. S. Kellogg.

Worcester, Mass.—Will spend \$25,000 on improving water works.

CONTRACTS AWARDED

Auburn, N. Y.—Warren Foundry & Machine Co., New York, has contract for 25,000 feet of 12-inch pipe at \$22.60 per ton and 2½ cents per pound for specials.

Buffalo, N. Y.—Contracts for pumping station equipment let: Farrar & Trefts, 10 boilers; McKenzie Furnace Co., 10 traveling stokers; induced draft for 16 boilers, Buffalo Forge Co.

De Soto, Mo.—H. D. Hallet, Aurora, Ill., was low bidder for works at \$60,350.

Fort Snelling, Minn.—A. J. Arhambo, Minneapolis, was low bidder for works.

Ithaca, N. Y.—Kellogg Iron Works, Buffalo, has contract for steel pump house.

Levis, Que.—Dussault & Power have contract for works at \$287,000.

Minneapolis, Minn.—U. S. Cast Iron Pipe & Foundry Co. has contract for 1,000 tons of pipe at \$24.15 per ton.

Paducah, Ky.—N. Y. Continental Jewell Filtration Co. has contract for filtration plant at South First street.

Paris, Tex.—C. W. Olcott, Dallas, has contract for seven miles of 12-inch main at 26½ cents per foot.

Reading, Pa.—Reading Foundry Co. has contract for castings, pipe, etc.

Seattle, Wash.—Pacific Coast Pipe Co. received contract for 17,035 feet of main at \$17.498.

South Bend, Ind.—U. S. Cast Iron Pipe Co. has contract for 500 tons of pipe.

(Continued on page 31.)

From the Daily Press

"The MUNICIPAL JOURNAL AND ENGINEER, of New York, is a periodical that should be placed by the city in the hands of every councilman and city official."

Scranton Tribune, Scranton, Pa.

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The Enquirer, Oakland, Cal.

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The Times, Leavenworth, Kansas.

"The MUNICIPAL JOURNAL of New York is a periodical which is recognized everywhere as authority in all matters which bear upon the growth and improvement of cities."

The Sun, Springfield, Ohio.

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The Oakland Enquirer, Oakland, Cal.

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The Standard, Bridgeport, Conn.

"The MUNICIPAL JOURNAL AND ENGINEER of New York is one of the ablest magazines published in this republic, and is replete with matters of interest to the officials and residents of every municipality in the country."

Herald, Bayonne, N. J.

"The MUNICIPAL JOURNAL AND ENGINEER of New York contains many practical articles relating to civic topics generally, and the subjects portrayed are most interesting to those engaged in municipal affairs."

Manitoba Free Press, Winnipeg.

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Press Knickerbocker Express, Albany, N. Y.

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Terre Haute Gazette, Terre Haute, Ind.

"The MUNICIPAL JOURNAL AND ENGINEER of New York is full of interesting suggestions and information."

Minneapolis Journal, Minneapolis, Minn.

"Indispensable to those who desire to become thoroughly informed regarding municipal matters."

The Tribune, New York.

"The MUNICIPAL JOURNAL of New York is fairly crowded with timely articles on municipal affairs. No public official can afford to do without this magazine."

The Times, Trenton, N. J.

Stanhope, N. J.—Stanhope-Netcong Water Co. received contract for 20 hydrants at Netcong.

SEWERS

Albany, Ga.—The sewers may be extended. A. J. Lippitt, Mayor.
Athens, Ga.—Will construct about one mile of 10-inch sewer. City Engineer Burnett.

Atlantic, Ia.—Plans prepared for sewers.

Aurora, Ill.—Plans to be made for sewers in District 6—1½ miles. City Engineer Tarble.

Bay City, Mich.—Considering a \$28,000 sewer for Park avenue.

Binghamton, N. Y.—Will expend \$85,000 for a trunk sewer.

Boston, Mass.—May vote on \$500,000 bonds for rebuilding sewer system.

Centreville, Ia.—An ordinance provided for a number of sewers.

Chillicothe, O.—Bids will be asked soon for \$10,500 15-inch pipe sewer. City Engineer Read.

Cicero, Ind.—J. A. Mitchell will survey for new sewers.

Cincinnati, O.—Surveys will be made for Millcreek sewer.

Cleveland, O.—Bids are wanted March 7 for \$20,000 sewer bonds. City Auditor.

Dansville, N. Y.—Will construct a sewer system.

Davenport, Ia.—It is said that the cost of the sewer in 14th District will be \$50,000.

Detroit, Mich.—Bids are wanted for \$100,000 sewer bonds. City Clerk Gaston.

Dolgeville, N. Y.—30,000 feet of 6- to 18-inch sewers will be constructed at a cost of \$42,000. S. B. Cleveland, Amsterdam.

Elmwood, N. J.—Plans have been made for a sewer system to cost \$75,000.

Eureka, Cal.—A vote is to be taken on a \$35,000 bond issue for sewer system. City Engineer Herrick.

Frankfort, N. Y.—A vote is to be taken on sewer system.

Franklin, Ind.—Plans have been made for a sewer system to cost \$75,000. City Engineer Middleton.

Ft. D. A. Russell, Wyo.—Bids are wanted March 3 for 16,610 feet of 8-inch sewer. Capt. W. S. Scott, Q. M., Cheyenne.

Ft. Harrison, Mont.—Bids are wanted March 1 for 1,625 feet of sewers, connections, etc. M. McHyde, Q. M., St. Paul, Minn.

Gloucester, Mass.—The report of the State Board of Health stated that a sewer system was necessary.

Graham, N. C.—A sewer system and water works are badly needed. Mayor Simmons.

Hammonton, N. J.—Surveys are to be made for sewer system.

Hartford, Conn.—A vote is to be taken on \$30,000 appropriation for extending sewers.

Lexington, Ky.—\$100,000 appropriated for a sewer system.

Longmont, Colo.—An \$80,000 sewer system will probably be built. City Clerk G. H. Stonex.

Ludington, Wash.—May build sewers and drainage system.

Manchester, Conn.—A sewer system may be installed this spring.

Marshall, Tex.—Bids are to be asked for about 22 miles of sewers to cost \$125,000.

Michigan City, Ind.—Contemplate a 3-foot brick sewer for Franklin street.

Monson, Mass.—A new sewer system may be installed.

New York, N. Y.—¾ miles of brick and pipe sewers are to be laid at a cost of \$400,000. Borough President Cassidy, Queens Borough.

Portsmouth, O.—A resolution provided for a \$38,500 storm sewer. Bids are wanted March 8 for a number of sewers. R. A. Bryan, Engineer.

Providence, R. I.—A resolution provided for a number of sewers.

Racine, Wis.—Plans accepted for the sewer on State street.

Richmond, Va.—Considering a \$1,590,000 sewer system. City Engineer Cutshaw.

Rochester, N. Y.—An ordinance for sewers being considered by Council.

St. Paul, Minn.—Estimated cost of sewer system for 6th Ward is \$50,000.

(Continued on page 32.)

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Salem, Mass.—Trunk sewer system in connection with Peabody will cost \$442,000. Mayor Peterson.

Seneca Falls, N. Y.—Will vote in March on sewer system.

Stamford, Conn.—\$78,000 sewer system proposed. City Engineer Nash.

Sumpter, Ore.—Estimated cost of sewer system recommended by Mayor McColloch, \$50,000.

Temple, Tex.—Contemplating construction of sewer system. The Mayor.

Washington, D. C.—Bids are wanted March 5 for sewage screens, etc., at pumping station. Henry L. West, Commissioner.

West Orange, N. J.—Have issued \$150,000 sewer bonds.

Westpoint, Miss.—Were to issue \$50,000 for a sewer system.

Wyandotte, Mich.—Have issued sewer bonds.

York, Pa.—Sold \$400,000 sewer bonds.

Youngstown, O.—Have issued \$16,540 sewer bonds.

CONTRACTS AWARDED

Belleville, Ill.—Hoeffken Bros. received contract for sewer at \$1,465.

Berwick, Pa.—Contract for sewers let James Nagle & Son, Allentown, at about \$45,000.

Boston, Mass.—Sessions Foundry Co. has contract for iron castings at \$1.54 per 100 pounds.

Buffalo, N. Y.—Rappich & Culliton were low bidders for sewers in several streets at \$30,703. James McElroy has contract for tile sewer in Freeman street at \$2,638.

Clinton, Ia.—G. M. King, Des Moines, has contract for McGregor avenue sewer at \$23,000.

Delray, Mich.—Elkhart Const. Co. has contract for McGregor avenue sewer at \$23,000.

Detroit, Mich.—Sheehan & Co. were low bidders for 1,800 feet of lateral sewers at \$2,035.

Ensley, Ala.—Contract awarded J. E. Hollingsworth & Co. for sanitary sewers at \$23,945, and W. H. Zuber & Co. for storm sewers at \$26,820.

Fort Snelling, Minn.—Allen Black & Co., of St. Paul, were low bidders for sewer system at \$2,490.

Gloucester City, N. J.—Aaron Ward, Camden, has contract for sewer work at \$11,459.

Los Angeles, Cal.—Chas. Forrester received contract for 20,000,000 brick for sewers and drains at \$6.40 per thousand.

Matteawan, N. Y.—M. J. Lahey, New York, was lowest bidder for sewer system at \$72,000.

Omaha, Neb.—It is said that M. P. Connolly has contract for Saddle Creek sewer at \$26,273, and to use Portland cement.

Paterson, N. J.—Jos. Puglia has contract for sewer.

Scranton, Pa.—Lowest bidder for Section G of 17th Sewer District was James F. O'Boyle.

Syracuse, N. Y.—John Young was low bidder for 10-inch sewer in Third N. and other streets at \$7,645.

Toledo, O.—John McMahon has contract for sewers at \$3,490.

PUBLIC BUILDINGS

Astoria, Ore.—A \$60,000 court house may be erected according to reports.

Atlantic City, N. J.—Bids are wanted March 18 for a new post office. J. K. Taylor, Treasury Department, Washington, D. C.

Bessemer, Ala.—A vote is to be taken on \$35,000 bonds for a school. The mayor.

Burlington, N. Y.—Resolutions provide for the issue of \$23,500 school bonds.

Detroit, Mich.—The Fire Commissioners have asked \$35,000 for a new fire station.

Fall River, Mass.—Three schools are contemplated for which \$150,000 are available.

Fernandina, Fla.—A \$90,000 city hall will be erected. Mayor McGiffin.

Franklin, Ind.—Bids are to be asked for a \$30,000 high school.

Grand Rapids, Mich.—May spend \$290,000 on a school this year. A \$30,000 armory is being planned.

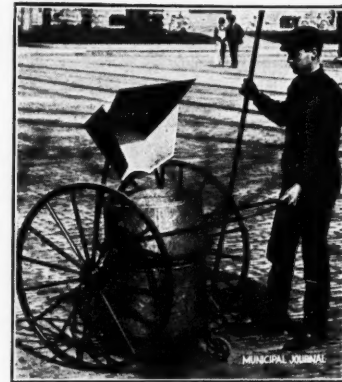
Herkimer, N. Y.—Plans for a municipal building are being considered.

(Continued on page 33.)



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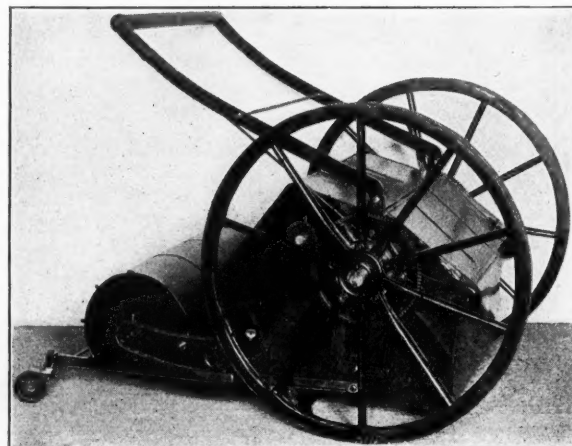


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Howard, S. D.—Considering the erection of a \$25,000 court house. Huntington, Ind.—Bids are wanted March 10 for a court house to cost \$200,000. J. W. Gaddis, architect, Vincennes.

Jefferson, Ia.—It was voted to issue \$20,000 school bonds.

Jersey City, N. J.—Have issued \$150,000 bonds for county buildings and plans have been prepared for the proposed courthouse. A new house will be erected for Engine 5.

Kalamazoo, Mich.—Plans have been prepared for a school. Board of Education.

Kentland, Ind.—Newton County Commissioners have been considering the erection of a \$140,000 court house.

Logansport, Ind.—A new school has been proposed. President Board of Education.

Louisville, Ky.—Considering the erection of a school, to cost \$30,000.

Marion, Ind.—Plans have been prepared for a \$95,000 jail. County Commissioners.

Missoula, Mont.—Considering the erection of a new \$100,000 court house.

Monmouth, Ill.—Considering a \$17,000 library. County Library Board.

Rensselaer, N. Y.—Mayor T. B. Kimber recommended a new city hall.

Springfield, Ill.—Plans accepted for a \$12,000 addition to a school. Superintendent of Schools.

Urbana, Ill.—Plans prepared for a \$40,000 jail.

Valdosta, Ga.—A vote is to be taken on \$35,000 bonds for a school.

Washington, D. C.—Plans prepared for new municipal building for which bids are soon to be asked.

Washington, Pa.—Will erect two new schools, to cost \$100,000.

W. Hoboken, N. J.—May erect a \$25,000 library.

White Plains, N. Y.—Considering a new wing for the county court house, to cost about \$100,000. Board of Supervisors, Westchester County.

Whittier, Cal.—Will have a \$75,000 school.

CONTRACTS AWARDED

Albany, N. Y.—Morris Kantowitz has contract for public bath and engine house at \$45,685.

Athens, Ga.—D. O. Brown & Son, Augusta, were low bidders for post office and court house at \$64,190.

Bellaire, O.—H. W. Clark, Woodsfield, has contract for high school at \$34,875.

Boston, Mass.—W. N. Pike & Son, Lawrence, have contract for school at \$116,064. P. H. Jackson, Brockton, has contract for school at \$114,730.

De Ridder, La.—Geo. D. Price has contract for school at \$7,000.

Grafton, W. Va.—Holbert & Speaden have contract for school at \$30,470.

Harrison, Ark.—Tom Lovell, Denton, Tex., was low bidder for post office and court house at \$71,515.

Kansas City, Mo.—J. C. Robinson, Chicago, Ill., has contract for addition to post office at \$311,911.

Leavenworth, Kan.—R. B. Yoakim has contract for high school at \$39,390.

Madison, S. D.—Contract for State Normal School let R. K. Hof-sas, Canton, at \$24,100.

New York, N. Y.—Hartman & Horgan have contract for school No. 39 at \$123,900.

Perryville, Mo.—Caldwell & Drake, Columbus, Ind., have contract for courthouse at \$31,819.

Rome, Ga.—Geo. Moore & Son have contract for extension to post office at \$38,948.

Selma, Ala.—Thos. Purvis has contract for library at \$9,800.

Syracuse, N. Y.—Wells Bros. Co., New York, were lowest bidders for court house at \$827,991.

Utica, N. Y.—Buckley Construction Co. has contract for court-house at \$735,373.

Washburn, Wis.—James A. Sheridan and A. W. Swain have contract for Carnegie Library at \$15,466.

(Continued on page 34.)

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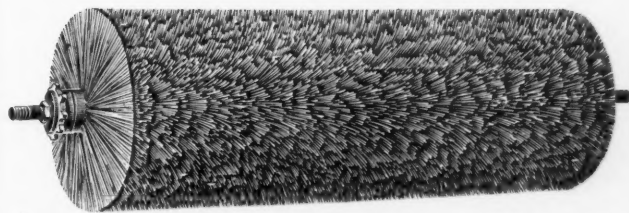
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FIRE SUPPLIES

Alpena, Mich.—Will consider fire equipment.
 Appleton, Wis.—Fire Chief George McGillan wants new ladders for hook and ladder truck.
 Barberton, O.—Will install 10-circuit fire alarm system.
 Bayonne, N. J.—6,000 feet of hose and 12 hose jackets are needed.
 Belleville, N. Y.—Considering fire alarm system for city.
 Birmingham, Ala.—Will ask bids for 5,000 feet of fire hose.
 Bloomfield, N. Y.—May have new fire house.
 Canton, Ill.—Fire Commissioners want four new engines and one new engine house.
 Covington, Ky.—May purchase automobile hose wagon.
 Cumberland, Md.—Want to issue \$25,000 bonds to establish paid fire department. City Clerk.
 Dayton, O.—Commissioner of Public Safety recommends 20 fire cisterns and purchase of 20 new fire alarm boxes.
 Derby, Conn.—May have fire alarm system.
 Des Moines, Ia.—Planning \$10,000 engine house on Lyon street.
 Detroit, Mich.—Fire Commissioners want new engine house and four new engines.
 Dover, N. Y.—May have fire alarm system.
 Fall River, Mass.—Fire Commissioners will ask for new engine and extensive repairs to fire houses.
 Findlay, O.—Board Public Safety wants funds to purchase 2,000 feet of hose.
 Glassport, Pa.—Boston Woven Hose Co. has contract for 1,000 feet of hose, at 80 cents per foot.
 Glenville, O.—Will erect \$8,000 engine house and put in an engine.
 Goshen, N. Y.—New contract for chemical engine will probably be made. Board of Trustees.
 Hancock, Mich.—Fire Department has petitioned council for additional hose.
 Hempstead, N. Y.—Considering fire alarm system.
 Houghton, Mich.—W. H. Thompson has contract for 500 feet of hose.

Hull, Mass.—Chief John L. Mitchell wants new engine.
 Jackson, Mich.—Fire Commission wants \$3,200 for new hose and \$2,000 for a truck.
 Joliet, Ill.—New ladder truck to be obtained.
 Kalamazoo, Mich.—Reported that city will purchase \$6,000 fire engine aerial truck and combination engine.
 Knoxville, Tenn.—May purchase new equipment for fire department.
 Lockport, N. Y.—Fire Commissioners want to install horse hose wagons, new alarm boxes, etc.
 Lowell, Mass.—Chief Hosmer asked for 2,000 feet of hose.
 Lynn, Mass.—Chief Downing wants two chemical engines.
 Mechanicsville, N. Y.—The Short Hooks Co. need new apparatus.
 Minneapolis, Ind.—Will buy 6,000 feet of 2½-inch hose, 1,000 feet of chemical hose. Chief J. R. Canterbury.
 New Haven, Conn.—Water tower wanted by Fire Commissioners.
 Niles, O.—Will purchase new fire apparatus outfit.
 Pennington, N. Y.—Will purchase chemical engine and hook and ladder truck.
 Perth Amboy, N. J.—Fire company to be formed. Lucien N. Bayer.
 Parterville, Cal.—Bids March 7 for 500 feet 2½-inch hose. City Clerk Velic.
 Portland, Me.—Chief Eldridge asked for a hose wagon and chemical tanks for Truck 3.
 Princeville, Ore.—Contract let Geo. Marley for fire alarm system.
 Rockland, Mass.—May purchase new hose wagon recommended by fire engineers.
 Syracuse, N. Y.—Commissioner of Public Safety Listman endorsed Chief Quigley's recommendation for those of the best kind.
 Terre Haute, Ind.—Chief Dougherty recommended new fire house, 1 truck, 2 fire engines, 1 chemical and hose.
 Toledo, O.—Council considering purchase of fire tug.
 Trenton, N. J.—May purchase new fire engine.
 Ventnor City, N. J.—Will form fire department.

(Concluded on page 35.)

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MINNEAPOLIS, MINN.

West Bay City, Mich.—Will erect house for new truck company. Chief Cook.

Wheeling, W. Va.—About 3,000 feet of hose and 2 new stations wanted by the chief.

Wilkes-Barre, Pa.—1,000 feet of hose should be purchased every year, according to Chief Schuler. Also asks for truck and engine.

Worcester, Mass.—Will purchase steam fire engine.

Wooster, O.—Contemplate purchase of combination hose and chemical wagon.

Yankton, S. D.—May purchase chemical engine.

York, Pa.—Royal fire Co. may equip a truck.

MISCELLANEOUS

Akron, O.—Petition calls for sewage disposal plant.

Atlanta, Ga.—Bids March 25 for garbage crematory.

Baltimore, Md.—May spend \$1,000,000 for parks. Mayor McLane.

Braddock, Pa.—Considering garbage disposal.

Burlington, Ia.—Worthington Bros'. bid for garbage disposal accepted.

Butler, Mo.—Bids March 17 for sewer system and disposal plant. J. L. Stanley, City Clerk.

Chicago, Ill.—South Park Commissioners have purchased 40 acres, to be improved into small park.

Cincinnati, O.—Will issue \$1,000,000 park bonds.

Cleveland, O.—Ordinance provides \$25,000 for park improvements.

Cohoes, N. Y.—Discussing street cleaning. Bids to be asked soon for hand and machine work.

Des Moines, Ia.—City Engineer J. W. Budd writes that Madden & Sheeley were low bidders for 16,700 line. ft. of oak piles at \$4,950.04.

Fitchburg, Mass.—Will have sewage disposal system.

Lexos, Tenn.—Planning garbage collection, etc. Mayor Rawlings.

Little Falls, N. Y.—City has given a park site which may be improved, etc. City Attorney O'Connor.

McKeesport, Pa.—Will have new garbage furnace.

Massillon, O.—Have estimates for garbage disposal plant under consideration.

Meriden, Conn.—C. W. Blakeslee & Son, of New Haven, have contract for street sprinkling at \$4,208.

Minneapolis, Minn.—Three new park sites have been recommended by Park Board Committee.

Omaha, Neb.—Will soon ask bids for garbage collection and disposal.

Ottawa, Can.—Ottawa Improvement Commissioners will improve land along Rideau River for park.

Sacramento, Cal.—May have garbage crematory.

St. Louis, Mo.—City may lease or buy garbage plant of the St. Louis Sanitary Co.

Sandusky, O.—Talking of change in garbage disposal. City Engineer.

Schenectady, N. Y.—Considering garbage disposal.

Scranton, Pa.—May operate crematory by contract.

Springfield, Mass.—Considering new North End Park. Architect Geo. C. Gardner.

Springfield, O.—J. M. Force, of Columbus, was low bidder for sewer system and disposal plant, at \$1,400.

Wheeling, W. Va.—Reported that bids are wanted for collection of garbage. Walter Worls, City Clerk.

York, Pa.—Will issue \$400,000 bonds for sewer system and disposal plant. R. E. Cochran, President Board of Public Works.

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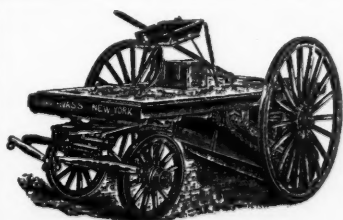
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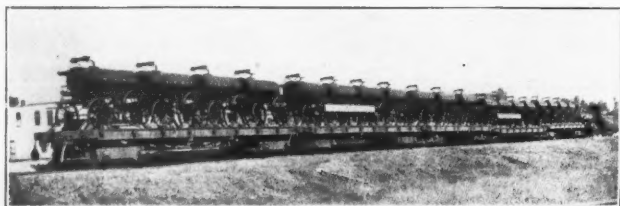
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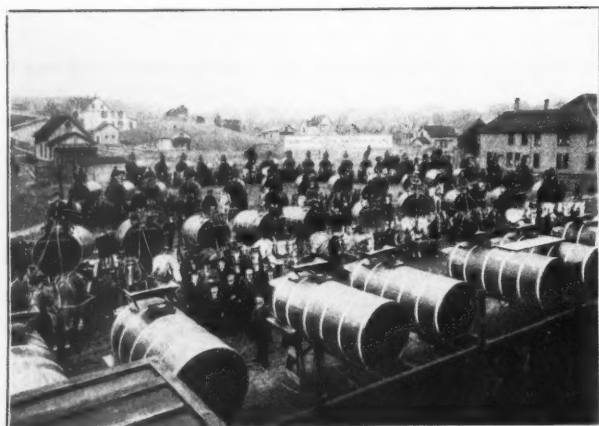
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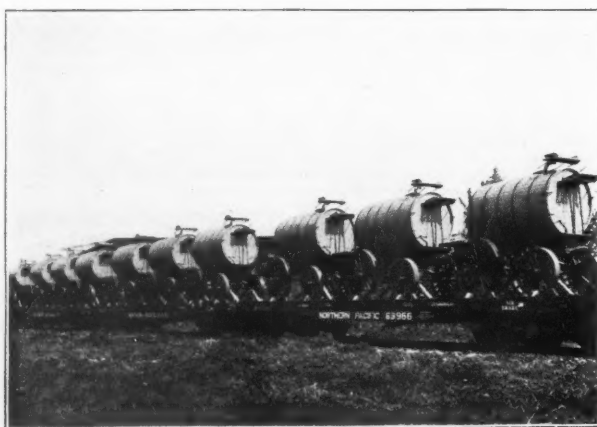
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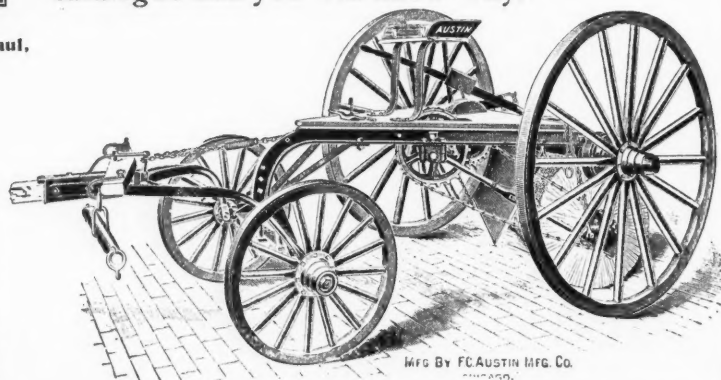
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